User's Manual

CITIZEN

LINE THERMAL PRINTER

MODEL iDP3221

Japan CBM Corporation

Declaration of Conformity

Manufacturer's Name : : Japan CBM Corporation
Manufacturer's Address : CBM Bldg., 5-68-10, Nakano, Nakano-ku
Tokyo, 164-0001, Japan

Declare the Product

Product Name: Line Thermal Printer
Model Number(s): iDP3221 Series
(iDP3221RF, iDP3221PF)
(S.No.9990001 ~)

Conform to the following Standards

LVD	: EN60950	: A11: 1997
EMC	: EN55022	: 1998 Class A
	: EN61000-3-2	: 1995
	: EN61000-3-3	: 1995
	: EN55024	: 1995
	: EN61000-4-2	: 1995 ±4KV CD, ±8KV AD
	: EN61000-4-3	: 1995 3V/m, 80MHz-1000MHz AM1KHz 80%
	: EN61000-4-4	: 1995 ±1.0KV (AC mains), ±0.5KV (Signal Lines)
	: EN61000-4-5	: 1995 ±1KV Normal mode, ±2KV Common mode
	: EN61000-4-6	: 1996 3V, 0.15MHz-80MHz AM1KHz 80%
	: EN61000-4-8	: 1993 50Hz, 3A/m (Out of scope)
	: EN61000-4-11	: 1994 10 ms/95%, 500 ms/30%, 5000 ms/100%

Supplementary Information

"The product complies with the requirements of the Low Voltage Directive 73/23/EEC, 93/68/EEC and the EMC Directive 89/336EEC, 92/31/EEC, 93/68EEC"

Place Tokyo, Japan

Date August.1999

Signature

Full Name : Mikio Moriya
Position : General Manager
R & D Department

Europe Contact :

Norco Declaration AB
Box 7146 S-250 07 Helsingborg Sweden

Warning

This is a Class A products. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This declaration is applied only for 230V model.

IMPORTANT SAFETY INSTRUCTIONS

- Read all of these instructions and save them for future reference.
- Follow all warnings and instructions marked on the product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use this product near water.
- Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
- Slots and openings on the back or bottom of the case are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, do not block or cover these openings. The openings should never be blocked by placing the product on a bed, sofa, rug of other similar surface. This product should never be placed near or over a radiator or heater. This product should not be placed in an built-in installation unless proper ventilation is provided.
- This product should be operated from the type of power source indicated on the marking label. If you re not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not place this product where the cord will be walked on.
- If an extension cord is used with this product, make sure that the total of the ampere ratings of the products plugged into the extension cord does not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
- Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.
- Except as explained elsewhere in this manual, do not attempt to service this product by yourself. Opening and removing the covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks. Refer all servicing on those compartments to service personnel.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  A. When the power cord or plug is damaged or frayed.
  B. If liquid has been spilled into the product.
  C. If the product has been exposed to rain or water.
  D. If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered be the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
  E. If the product has been dropped or the cabinet has been damaged.
  F. If the product exhibits a distinct change in performance, indicating a need for service.
- Please keep the poly bag which this equipment is packed in away from children or throw it away to prevent children from putting it on. Putting it on may cause suffocation.

WICHTIGE SICHERHEITSANWEISUNGEN

- Lesen Sie die nachfolgenden Anweisungen sorgfältig durch und bewahren Sie sie auf.
- Befolgen Sie alle auf dem Drucker vermerkten Hinweise und Anweisungen. Vor dem Reinigen grundsätzlich Stecker aus der Steckdose ziehen. Keine Flüssigkeiten oder Aerosolreiniger benutzen. Nut mit einem feuchten Tuch abwischen.
- Der Drucker darf nicht in der Nähe von Wasser aufgestellt werden.
- Drucker nicht auf einem unstabilen Wagen, Stand oder Tisch aufstellen. Der Drucker könnte herunterfallen und dabel beschädigt werden.
- Schlitze und Öffnungen im Gehäuse, in der Rückwand und im Boden dienen der Belüftung. Sie dürfen keinesfalls zugedeckt oder blockiert werden, da sich der Drucker sonst überhitzt. Drucker nicht auf ein Bett, Sofa, Teppich oder dergleichen stellen. Drucker nicht in der Nähe eines Heizkörpers aufstellen. Drucker darf nicht eingebaut werden, falls nicht für ausreichende Belüftung gesorgt ist.
- Drucker nur mit der auf dem Typschild angegebenen Spannung betreiben. Wenn Sie sich nicht sicher sind, fragen Sie ihren Händler oder ihr zuständiges Elektrizitätswerk.
- Nichts auf das Stromanschlußkabel stellen. Kabel muß so verlegt werden, daß man nicht darauftreten kann.
- Ein etwaiges Verlängerungskabel muß der Stromstärke aller daran angeschlossenen Geräte entsprechen.
- Keine Gegenstände in die Gehäuseschlitze schieben.
- Drucker darf nur da gewartet werden, wo im Handbuch angegeben, Öffnen und. Abnehmen von Abdeckungen, die mit "Do not remove" gekennzeichenet sind, könnte gefährliche spannungführende Stellen oder sonstige Gefahrenpunkte freilegen. Die Wartung solcher Stellen darf grundsätzlich nur von besonders ausgebildetem Fachpersonal vorgenommen werden.
  A. Wenn das Stromanschlußkabel oder der Stecker beschädigt oder durch-gescheuert ist.
  B. Wenn Flüssigkeit auf dem Drucker verschüttet wurde.
  C. Wenn der Drucker im Regen gestanden hat oder Wasser darauf verschüttet wurde.
  D. Wenn der Drucker trotz genauer Befolgung der Betriebsvorschriften nicht richtig arbeitet. Nur die in der Bedienungsanleitung angegebenen Einstellungen vornehmen. Ein Verstellen anderer Bedienungselemente könnte den Drucker beschädigen und macht umständliche Arbeiten eines qualifizierten Technikers erforderlich, um den Drucker Wieder auf den normalen Betrieb einzustellen.
  E. Wenn der Drucker heruntergefallen ist oder das Gehäuse beschädigt wurde.
  F. Wenn der Drucker in seiner Leistung nachläßt.
- Bitte halten Sie den Kunststoffbeutel, in den die Ware verpackt ist, von Kindern entfernt, oder werfen Sie ihn weg, damit er nicht in die Hande von Kindern gerät. Das Überstülpen des Beutels kann zum Ersticken führen.

Lärmemission kleiner 70dBA

IMPORTANT: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 off FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

CAUTION: Use shielded cable for this equipment.

Sicherheitshinweis

Die Steckdose zum Anschluß dieses Druckers muß nahe dem Grät angebracht und leicht zugänglich sein.

For Uses in Canada

This digital apparatus does not exceed the class A limits for radio noise emissions from digital, apparatus, as set out in the radio interference regulations of the Canadian department of communications.

Pour L'utilisateurs Canadiens

Cet appareil numérique ne dépasse pas les limites de carégorie a pour les émissions de bruit radio émanant d'appareils numériques, tel que prévu dans les réglements sur l'interférence radio du départment Canadien des communications.

<CAUTIONS>

1. Prior to using the equipment, be sure to read this User's Manual thoroughly. Please keep it handy for reference whenever it may be needed.
2. The information contained herein may be changed without prior notice.
3. Reproduction of part or all of this User's Manual without permission is strictly prohibited.
4. Never service, disassemble, or repair parts that are not mentioned in this User's Manual.
5. Note that we will not be responsible for damages attributable to a user's incorrect operation/ handling or an improper operating environment.
6. Operate the equipment only as described in this User's Manual; otherwise accidents or problems may result.
7. Data are basically temporary; they cannot be stored or saved permanently or for a long time. Please note that we will not be responsible for damages or losses of profit resulting from losses of the data attributable to accidents, repairs, tests, and so on.
8. If you have any questions or notice any clerical errors or omissions regarding the information in this manual, please contact our office.
9. Please note that, notwithstanding Item 8 above, we will not be responsible for any effects resulting from operation of the equipment.

SAFETY PRECAUTIONS ----- BE SURE TO OBSERVE

In order to prevent hazards to an operator or other persons and damage to property, be sure to observe the following precautions.

- The following describes the degrees of hazard and damages that can occur if the given instructions are neglected or the equipment is incorrectly operated.

⚠ **WARNING**	Negligence of this precaution may result in death or serious injury.
⚠ **CAUTION**	Negligence of this precaution may result in injury or damage to property.

⚠ This is an illustration mark used to alert your attention.

ⓘ This is an illustration mark used to indicate such information as an instruction or the like.

⚠ WARNING

- Never handle the equipment in the following manners, as it may break, become out of order, or overheat causing smoke and resulting in fire or electric shock.
  If the equipment is used in an abnormal condition, such as when broken, then problems, smoke emission, abnormal odor/noise, and fire can result. If an abnormal condition exists, be sure to turn off the power, disconnect the power plug from a plug socket, and contact our dealer. Never repair the equipment on your own - it is very dangerous.
- Do not allow the equipment to receive a strong impact or shock, such as kicking, stomping, hitting, dropping, and the like.
- Install the equipment in a well-ventilated place. Do not use it in such a manner that its ventilation port will be blocked.
- Do not install the equipment in a place like a laboratory where chemical reactions are expected, or in a place where salt or gases are contained in the air.
- Do not connect/disconnect a power cord or a data cable, while holding the cable. Do not pull, install, use, or carry the equipment in such a manner that force will be applied to the cables.
- Do not drop or insert any foreign substances, such as clips or pins, into the equipment.
- Do not spill any liquid or spray any chemical-containing liquid over the equipment. If any liquid is spilled on it, turn off the power, disconnect the power cable and power cord from the plug socket, and so on, and contact our dealer.
- Do not disassemble or remodel the equipment. Negligence of this may cause fire or electric shock.
- Should you drop or break this AC adapter by any chance, unplug it immediately and contact our office. Using it in that condition may result in fire or electric shock.
- Should water enter inside the equipment by any chance, unplug it and contact our office. Using it in that condition may result in fire or electric shock.
- Use the equipment only with the specified commercial power supply. Negligence of this may result in fire, electric shock, or problems.
- Do not damage, break, process, bend/pull by force, twist, or bundle an AC adapter cord. Also, do not put a heavy substance on it or heat it. The AC adapter could be broken, resulting in fire, electric shock, or trouble. If the AC adapter cord is damaged, contact our office.
- Do not connect/disconnect the AC adapter with wet hands. It may result in electric shock or other problems.
- Do not overload a single electrical outlet, using a table tap or a current tap socket. It may result in fire or electric shock.

- An equipment packing bag must be discarded or kept away from children. A child can suffocate if the bag is placed over the head.

⚠ PRECAUTIONS FOR INSTALLATION

- Do not use or store the equipment in a place exposed to fire, moisture, or direct sunshine, or in a place near a heater or thermal device where the prescribed operating temperature and humidity are not met, or in a place exposed to much oil, iron powder, or dust. The equipment may become out of order, emit smoke, or catch fire.
- Do not install or use the equipment in a place like a laboratory where chemical reactions are expected, or in a place where salt or gases are contained in the air. There is a danger of fire or electric shock.
- Install the printer on a flat, stable desk or table that is free from vibration, in a well-ventilated place.
- Do not place anything on the printer or leave small objects, like a clip or pin, around it. A foreign object could cause trouble if it gets inside.
- Do not use the equipment near a radio or TV receiver. Do not share the power from a plug socket a radio or TV receiver is connected to. It may cause a reception problem.
- Use the equipment only at the specified power supply, voltage and frequency. Otherwise, it may emit smoke and catch fire or cause other problems.
- Connect only the specified power source. Use of an unspecified power source could cause trouble or smoke/fire.
- Confirm that a plug socket used for connection has sufficient capacity.
- Avoid connecting a power cable to a plug socket shared by other devices or extending the wiring too far. It may result in the cable catching fire or a power outage. Also, do not step on or apply an excessive force (Pull, load) to the cable, and do not use the printer with such a force applied to it.
- Never connect a grounding cable (Frame ground) to a gas pipe. There is a danger of explosion. When connecting or disconnecting the grounding cable, be sure to disconnect the power cable and the power plug from the plug socket.
- When connecting/disconnecting the cables, be sure to turn off the power first, including the connected side, and then connect/disconnect them, holding a plug and a connector. Pulling the cable itself could cause it to snap or become damaged.
- Connect a power cable or a connector cable securely. If a reverse-polarity connection is made, internal elements may be broken or a mating device may be adversely affected.
- Use a shielding wire or twisted pair wire for a signal line, in order to minimize noise effect. Do not route the cable too long or connect it to a noisy device. Connection to a noisy device could cause erroneous printing due to corrupt data, and so on.
- When a drawer kick connector is provided, do not connect any device other than the prescribed solenoid specifications. Negligence of this could cause trouble.
- Use the equipment in an environment where there is a plug socket near the main body and you can easily disconnect the power plug from it, to shut off the power.
- When the equipment will not be used for a long period of time, unplug it and remove the paper roll from it.
- When transporting the equipment, remove the paper roll from the paper holder.

⚠ PRECAUTIONS FOR HANDLING

Do not handle the equipment in the following manners, because problems may result.

- Do not use any other power source besides the accessory AC adapter. Also, do not use the AC adapter for other purposes.
- Do not print without paper.
- Do not drop or put any foreign object, such as a clip, pin, or the like, inside the printer.
- Do not spill any liquid or spray any chemical-containing liquid over the equipment.
- Do not stamp on, drop, hit, or give a strong shock to the equipment.
- Never use a pointed object, such as a pen, to operate the operation panel.
- Do not use Scotch tape to fasten paper together for continuous use. It could damage the printing head.
- Never pull the set paper forcibly.

To Prevent Injury and Spreading of Damage

- Do not touch the printing part of the print head.
- When turning on the power, do not touch the moving parts, such as a cutter and gear inside the main body, or electric parts.
- Be careful to avoid bodily injure or damaging other objects with an edge of sheet metal.
- Should any error occur while operating the equipment, stop it immediately and disconnect the power plug from the plug socket.
- Should a problem occur, leave solving it to our serviceman. Do not disassemble the equipment on your own.

ⓘ DAILY MAINTENANCE

- At the time of maintenance, be sure to turn off the power switch of the printer and unplug it from the socket.
- When cleaning the platen, wipe off dust or dirt from the platen with a cotton swab dipped in ethyl alcohol.
- Use a dry soft cloth to wipe off stains and dust from the surfaces of the main body case. For severe soiling, dip the cloth in water and wring it, for wiping off the soil. Never use organic solvents, such as alcohol, thinner, trichlene, benzene, ketone, or chemical dusters.
- If the equipment is contaminated with paper powder, use a soft brush to clean it. Be careful not to damage the printing head.

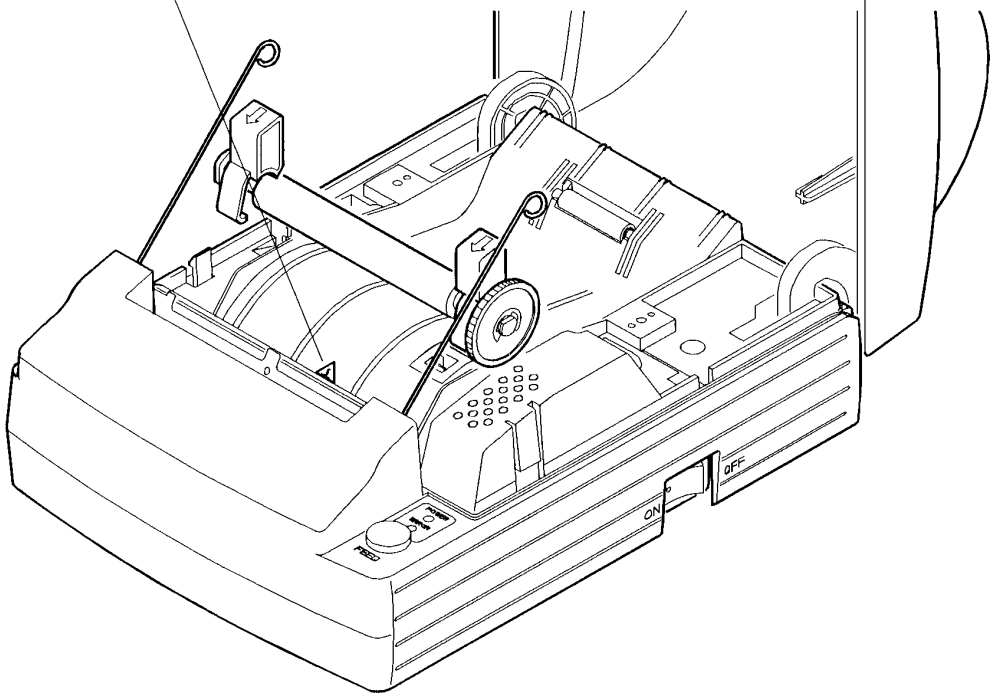
⚠ **CAUTION:** The printing head and motor are very hot. Be careful not to touch them immediately after printing.

- Cleaning the Printing Head
  1. Referring to "4.6 Removing Paper Jam," detach the platen roller unit.
  2. Moisten gauze slightly with alcohol, and clean the heating surface of the printing head with it.
  3. Reattach the platen roller unit.

⚠ **CAUTION:** The printing head and motor are very hot. Be careful not to touch them immediately after printing. Do not touch the heating surface of the head with a bare hand or metal.

A caution label is stuck onto the following place. Carefully read the cautions on operation to correctly use the printer.

This label warns that the head becomes hot in operation, and touching it may result in burns.



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1. OUTLINE

This is a small line thermal printer developed to be used for various data communication terminals, POS terminals, kitchen printer, and so on. With its abundant features, it can be widely used for various types of applications. Prior to using the printer, read this manual thoroughly to understand its contents..

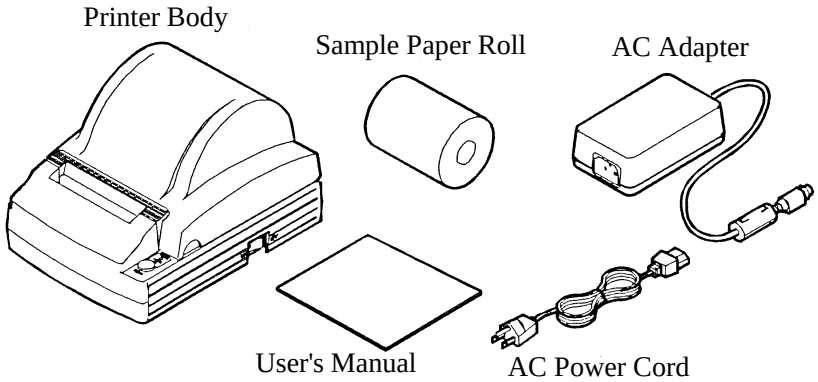
1.1 Features

1. Small, lightweight, with a small footprint.
2. Designed with a reduced number of components to ensure low cost.
3. Paper is added by simply placing the paper and closing the cover.
4. A removable platen mechanism simplifies maintenance (e.g. paper handling and head cleaning).
5. Line thermal printing for high speed and low noise.
6. A long-life head with a simple mechanism to ensure high reliability.
7. Built-in input buffer.
8. Bar code printing (with special commands).
9. Built-in drawer kick-out interface.
10. Auto cutter fitted as standard.
11. User registration of external characters.

1.2 Unpacking

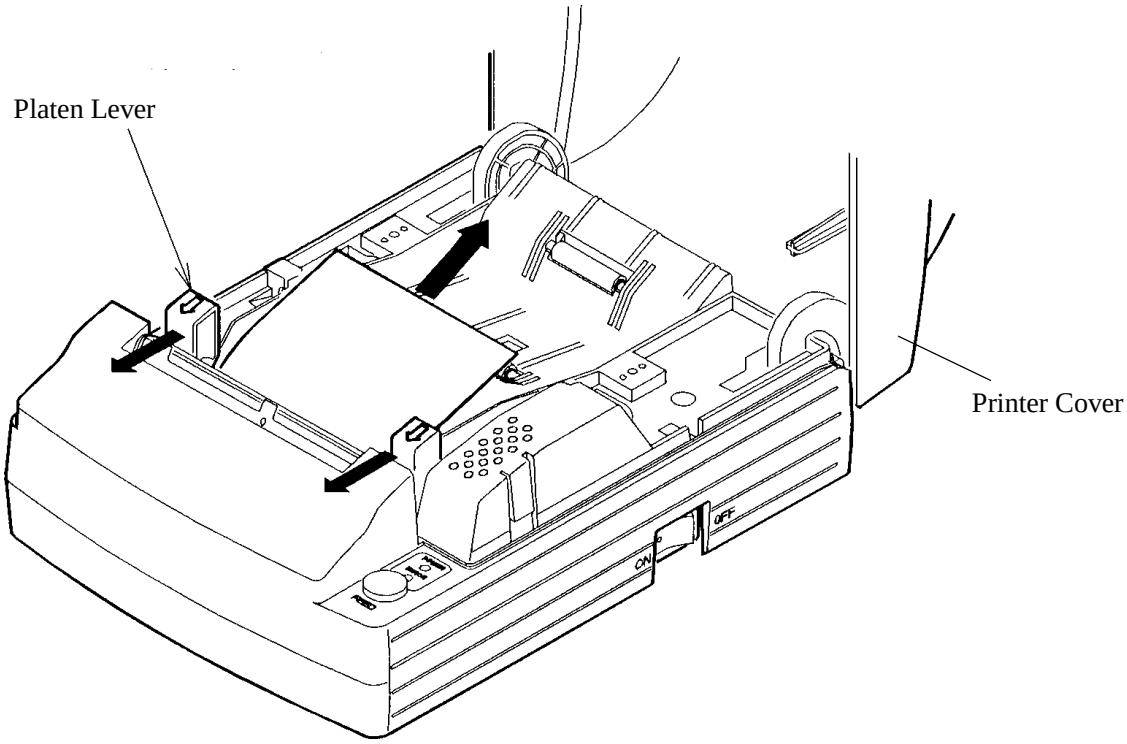
(1) When unpacking the printer, confirm that the following parts are provided.

- Printer body ----- 1 unit
- Sample paper roll ----- 1 roll
- AC adapter ----- 1 piece
- AC power cord ----- 1 piece
- User's manual ----- 1 copy



(2) Before using the printer, remove the protective paper for the head as shown below:

1. Open the printer cover.
2. Pull the platen levers at both sides of the platen roller unit in the direction of the arrows.
3. Pull the protective paper in the direction of the arrow.
4. Insert a sheet of printer paper between the platen roller and the head when the printer is to remain unused for a long period of time.



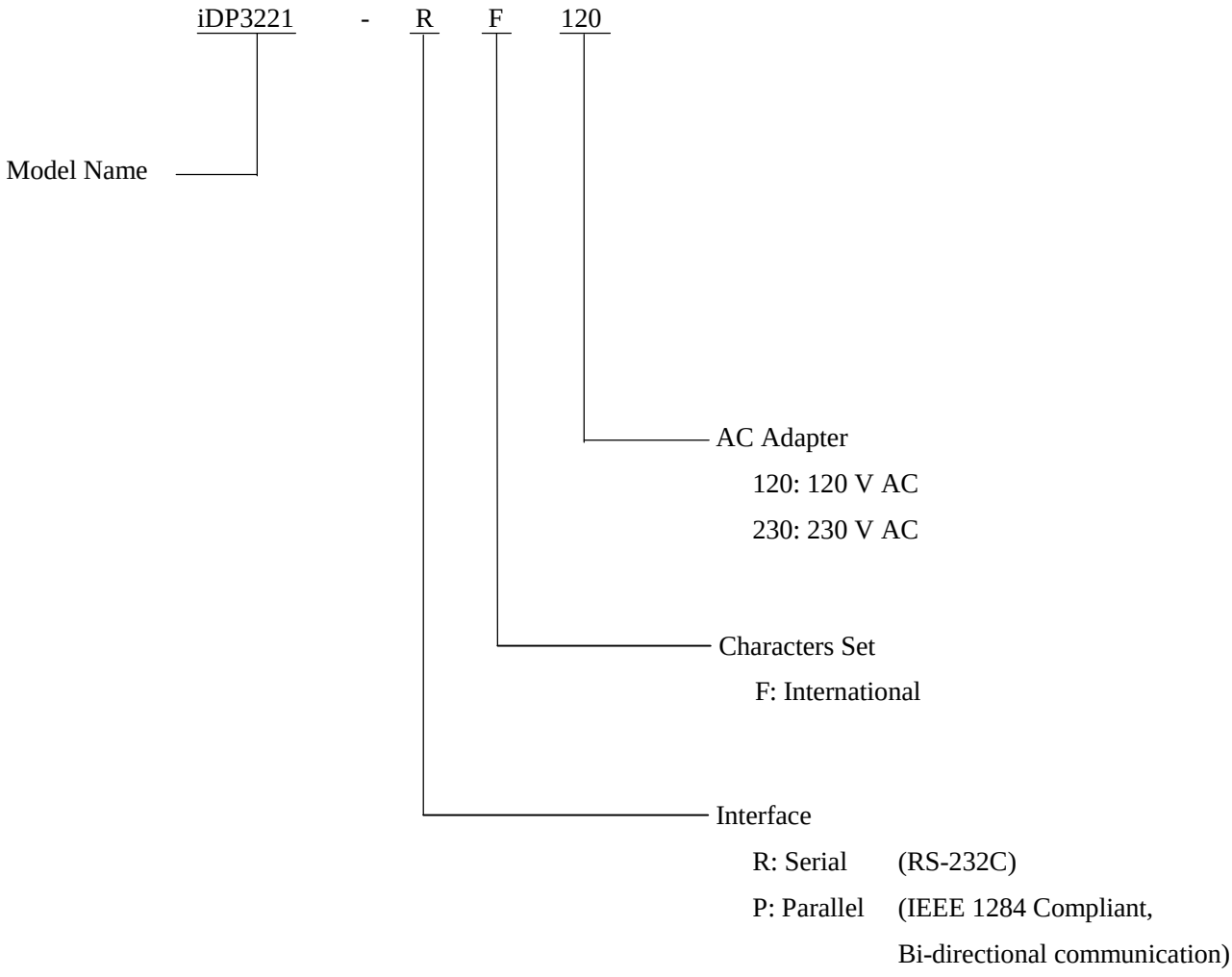
⚠ CAUTION :

- Install the printer on a flat and stable desk.
- Do not install the printer near a heater or in a place exposed to direct sunlight.
- Do not use the printer in a high-temperature, high-humidity, and contaminated environment.
- Do not allow dew condensation on the printer. If dew is condensed on it, leave the power turned off until dew condensation is gone.

2. BASIC SPECIFICATIONS

2.1 Model Classifications

The models are classified by the following designation method:



* Special AC Adapter and AC Power Cord

31AD-U (120V AC --- 3-core cord)

31AD-E (230V AC --- Class I cord)

2.2 Basic Specifications

Item \ Model	iDP3221−RF120 iDP3221−PF120	iDP3221−RF230 iDP3221−PF230
Printing system	Line thermal dot printing	
Printing width	72.192 mm/512 dots	
Dot density	Width: 0.141 mm, Length: 180 DPI (0.141 mm)	
Printing speed	63.45 mm/sec. (At maximum speed, print density level 2), (450-dot line/sec.)	
Printing columns	42 columns (Font A) , 56 columns (Font B)	
Printing size	1.41×3.39 mm (Font A) , 0.99×3.39 mm (Font B)	
Line pitch	4.23 mm (1/6 inch) Can be set with a command (See 10.2 "Command Details.")	
Character types	Alphanumeric, international characters, extended graphic	
Bar code type	UPC-A/E, JAN(EAN) 13-/18-column, ITF, CODE 39, CODE 128, CODABAR, CODE 93	
Paper	Thermal paper roll : 80 + 0/- 1 mm×ϕ83 (max.) mm (See Paper Specifications)	
Interface	Serial (RS-232C) Parallel (IEEE 1284 compliant) (Bi-directional communication)	
Input buffer	4 KB or 72 bytes (Selectable with the DIP switch)	
Supply DC voltage	24 V DC +/- 7%	
Power consumption	100 W	
AC adapter	Rated input : 100~240 V AC, 50/60 Hz, 120 VA Rated output : 24 V DC, 1.8 A	
Type	31AD-U	31AD-E
Weight	Main body: Approx. 1.3 Kg AC adapter: Approx. 450 g	
Outer dimensions	152 (W) × 201 (D) × 123 (H) mm	
Operating temperature and humidity	5 ~ 40°C, 35 ~ 85 % RH (No dew condensation)	
Storage temperature and humidity	-20 ~ 60°C, 10 ~ 90% RH (No dew condensation)	
Reliability	Printing head life: Pulse resistance : 50 million pulses or more (Print rate 12.5%) Wear resistance : 50 km or more (With recommended thermal paper at normal temperature and humidity) Auto cutter life: 500,000 cuts (With recommended thermal paper at normal temperature and humidity)	
Applicable standard *1	UL, C-UL, FCC Class-A	TUV, GS, CE Marking

Note: *1 indicates the standard satisfied when the AC adapter (31AD series) is used.

2.3 Paper Specifications

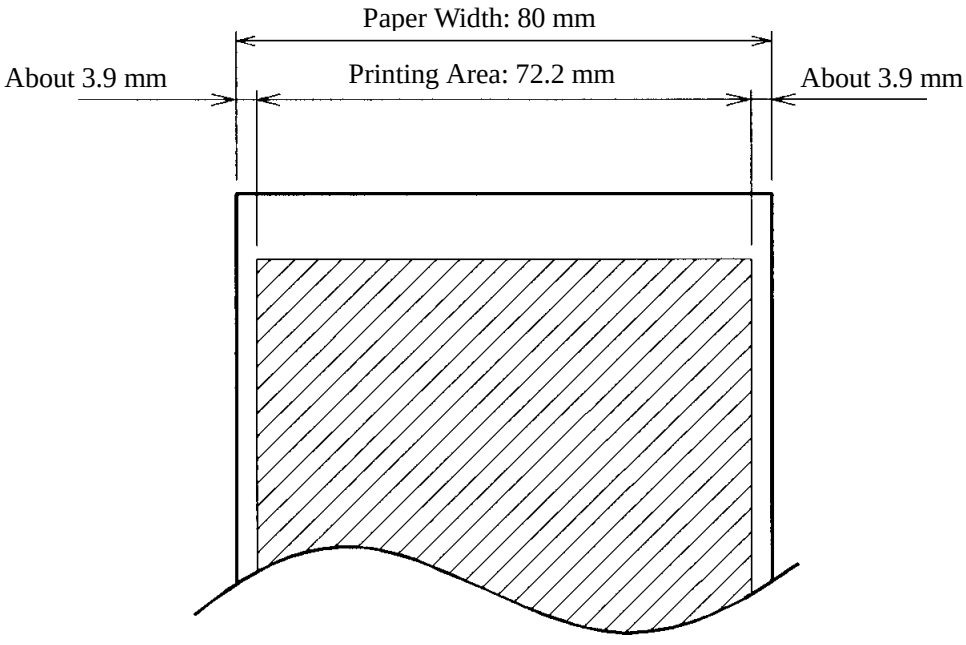
2.3.1 Recommended Paper

- Type : Thermal paper
- Paper width : 80 + 0/- 1 mm
- Paper thickness : 60~75μm
- Roll diameter : ϕ83 mm or less
- Printing surface : Outside of the roll (Surface)
- Recommended paper : TF50KS-E2C (Monochrome) made by NIPPON SEISHI or its equivalent
- Core : ϕ12 mm (Inner diameter), ϕ18 mm (Outer diameter)

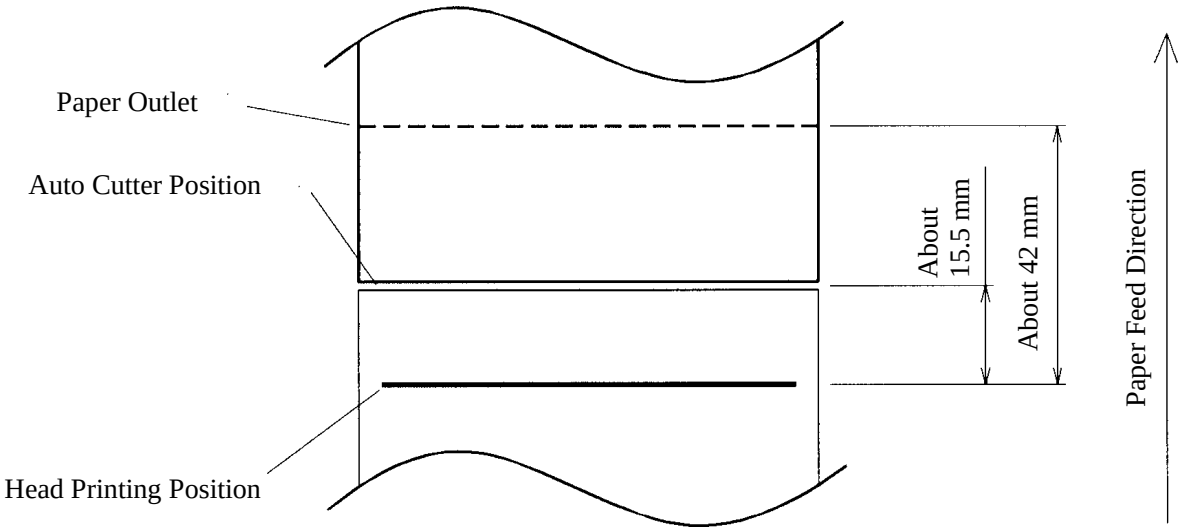
⚠ CAUTION:

- Use of non-specified paper may cause irregularity of print density. If this is the case, use the DIP switch to select print density. (See 5. DIP SWITCH SETTING)
- Do not paste the paper to the core.
- If the paper comes in contact with a chemical or oil, it may discolor or lose a record.
- Do not rub the paper surface strongly with a nail or hard metal. It may discolor.
- •. Discoloring starts at about 70°C. Watch out for effects of heat, humidity, light, and so on.

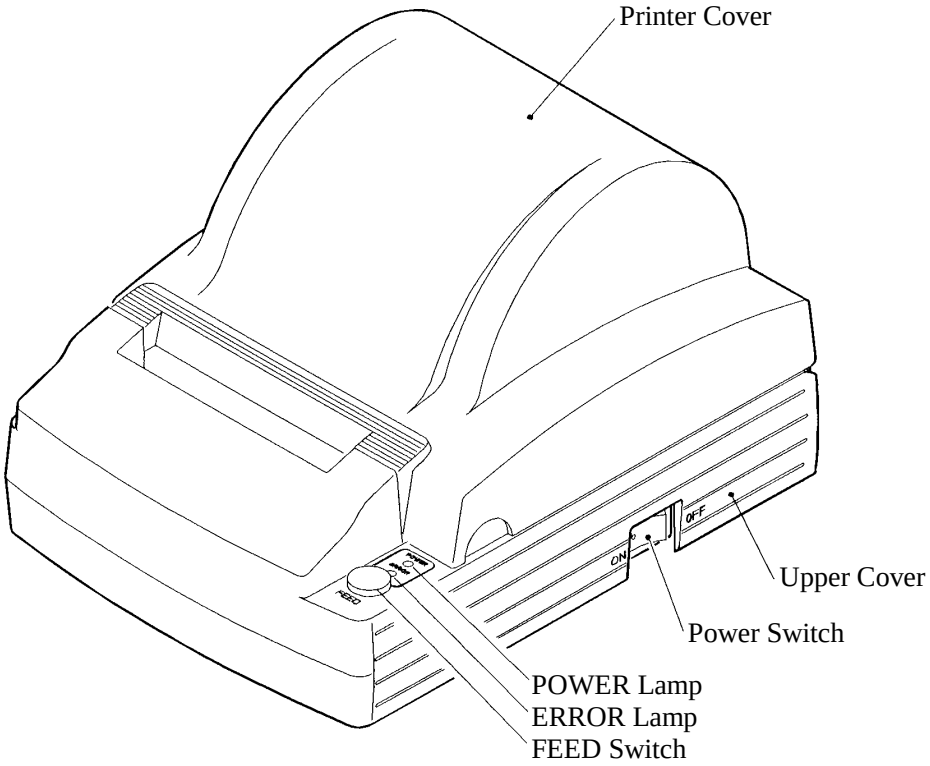
2.3.2 Printing Position

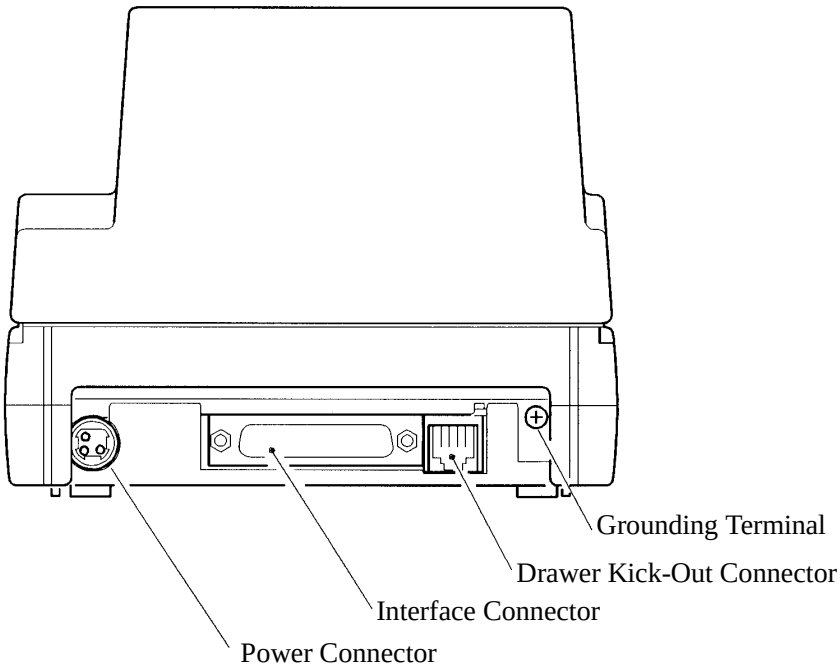


2.3.3 Head and Paper Cutter Layout



3. OUTER APPEARANCE AND COMPONENT PARTS





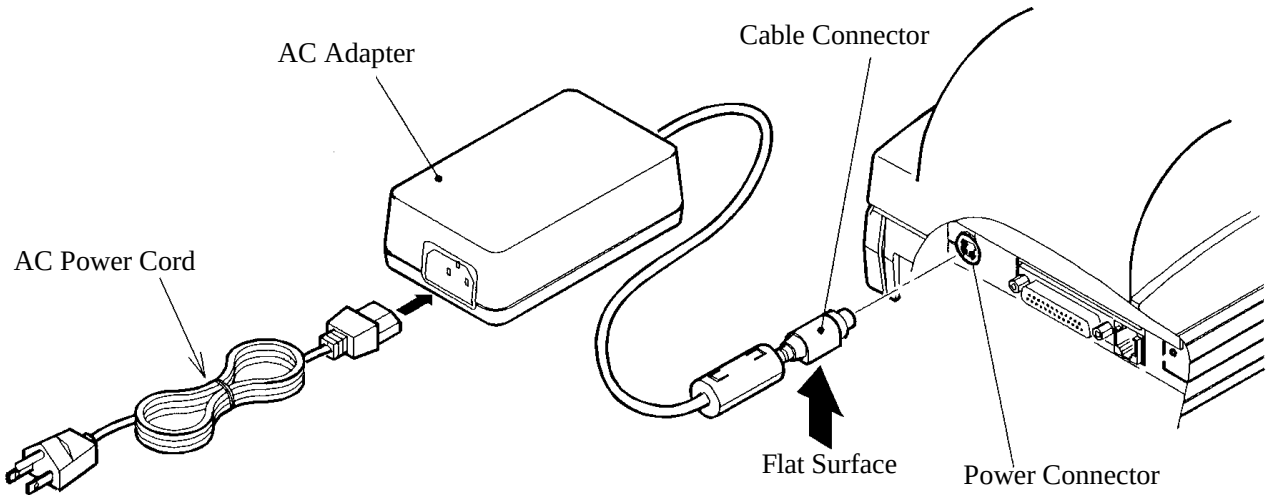
4. OPERATION

4.1 Connecting AC Adapter

1. Turn off the power.
2. With the flat surface on the AC adapter cable connector facing downwards, plug it into the power connector at the rear of the printer.
3. Connect the AC power cord to the AC adapter, and plug it into an AC outlet.

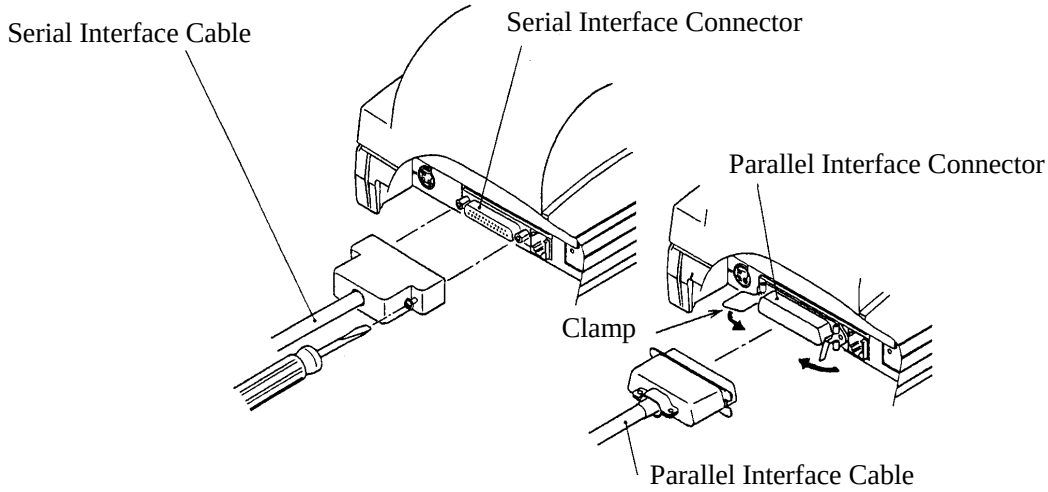
⚠ CAUTION:

- Use only the specified AC adapter.
- When disconnecting/reconnecting the cable connector of the AC adapter, be sure to hold the connector.
- Separate the AC adapter from other noise-generating devices.
- Pulling the AC power cord may damage it, resulting in a fire, electric shock, or snapping.
- If a thunder/lightning storm is nearby, disconnect the AC adapter from the socket and do not use the printer, because a fire or electric shock may occur.
- Do not put the AC power cord close to a heating device. Its coating can melt and cause a fire or electric shock.
- After using the printer or when not using it for a long period of time, be sure to unplug the AC adapter from a plug socket for your safety.



4.2 Connecting Interface Cable

1. Turn off the power. (Mating side included)
2. Check the top and bottom of cable terminals, and connect to the interface connector.
3. Fix the cable terminals. Serial interface : Tighten screws, to fix it.
   Parallel interface : Turn clamps, to fix it.
4. Connect the cable to the host computer.

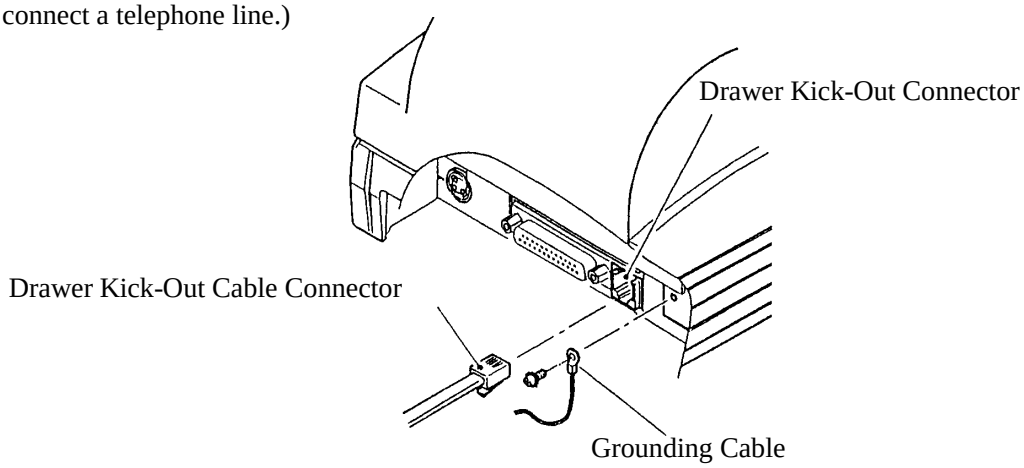


4.3 Connecting the Drawer Kick-Out Connector

1. Turn off the power.
2. Check the top and bottom of the drawer kick-out cable connector and connect it to the drawer kick-out connector located on the back of the printer.
3. Screw the grounding cable of the drawer to the grounding terminal of the printer.

⚠ CAUTION:

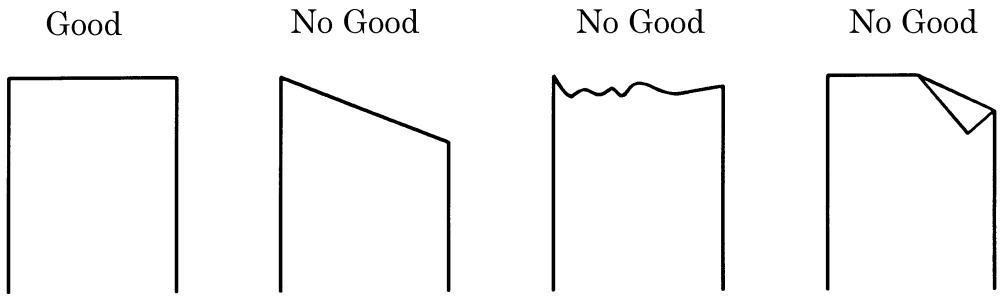
• Connect only the prescribed drawer (Solenoid) to the drawer kick-out connector.
(Do not connect a telephone line.)



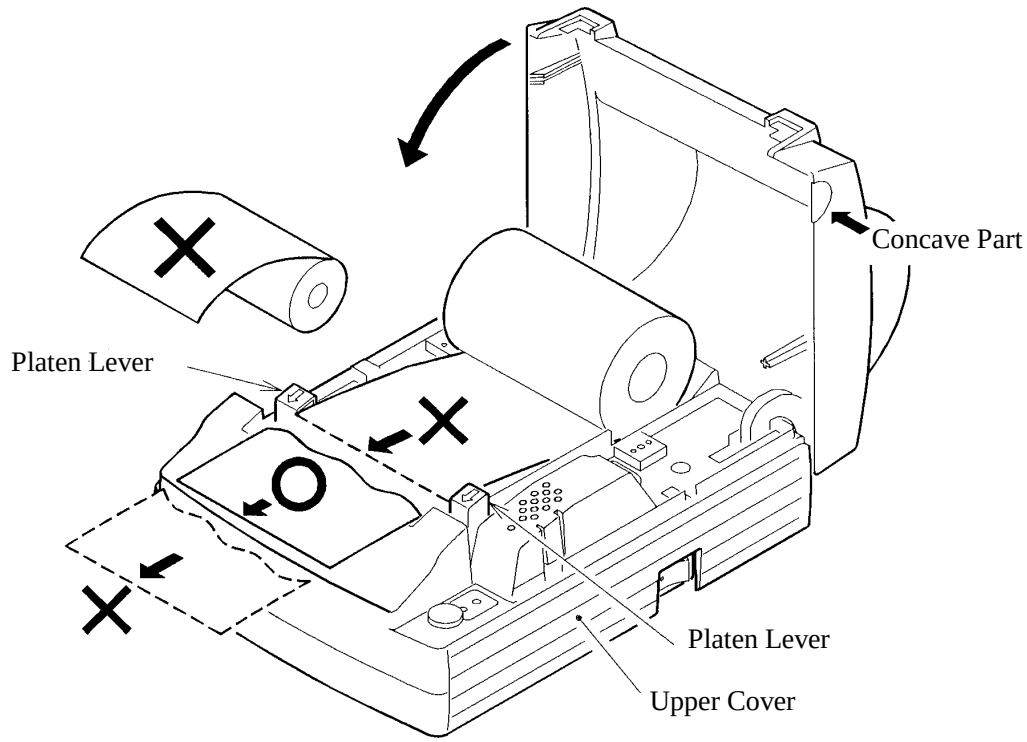
4.4 Inserting the Paper

4.4.1 Inserting the Paper

1. Turn on the power.
2. Put your hands in the concave parts on both sides of the printer cover, and open it until it comes to a stop.
3. Cut the end of the paper roll at close to a right angle.



4. Ensure that the paper roll is placed correct side up in the roller part in the upper cover.
5. Check that the paper roll is between the platen levers, pull the end of the paper out to the edge of the upper cover, and close the printer cover. The paper is automatically fed in and comes out the paper outlet of the printer.
6. Cut the surplus paper by the tear bar at the paper outlet of the auto cutter.



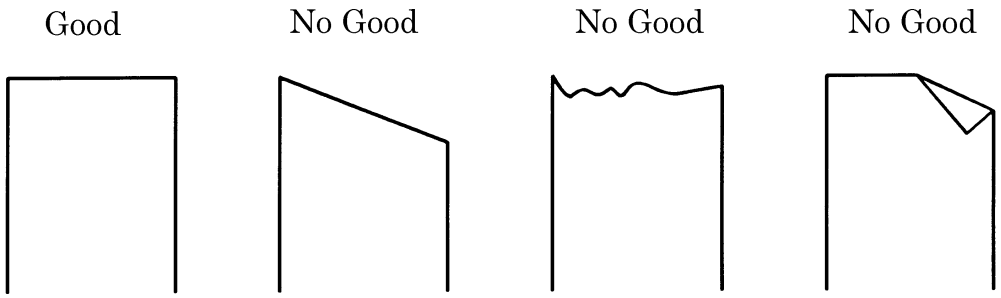
⚠ CAUTION:

- Be sure to use the specified paper roll.
- Use of non-specified paper may not guarantee the print quality, printing head life, and so on.
- The printer cover is not detachable. Do not apply an excessive force beyond its stopping position.
- Do not insert a ragged or dog-eared end of the paper roll, because it could result in a paper jam or insertion error.
- Always pull the end of the paper roll out to the edge of the upper cover. Take care to ensure that the paper is not beyond or before the edge of the cover.
- When the paper roll has been set in place, the end of the paper may be fed from the paper outlet in a folded or creased condition. If the paper does not appear at the paper outlet, check the end of the paper and set it in place again.
- If the paper roll is skewed, pull the platen lever forward to correct its position.
- Do not open the printer cover while printing.
- Holding or touching the paper roll during printing may result in a paper jam.
- When the auto cutter is used for full cutting, remove the cut paper before starting the next print operation to prevent jamming.

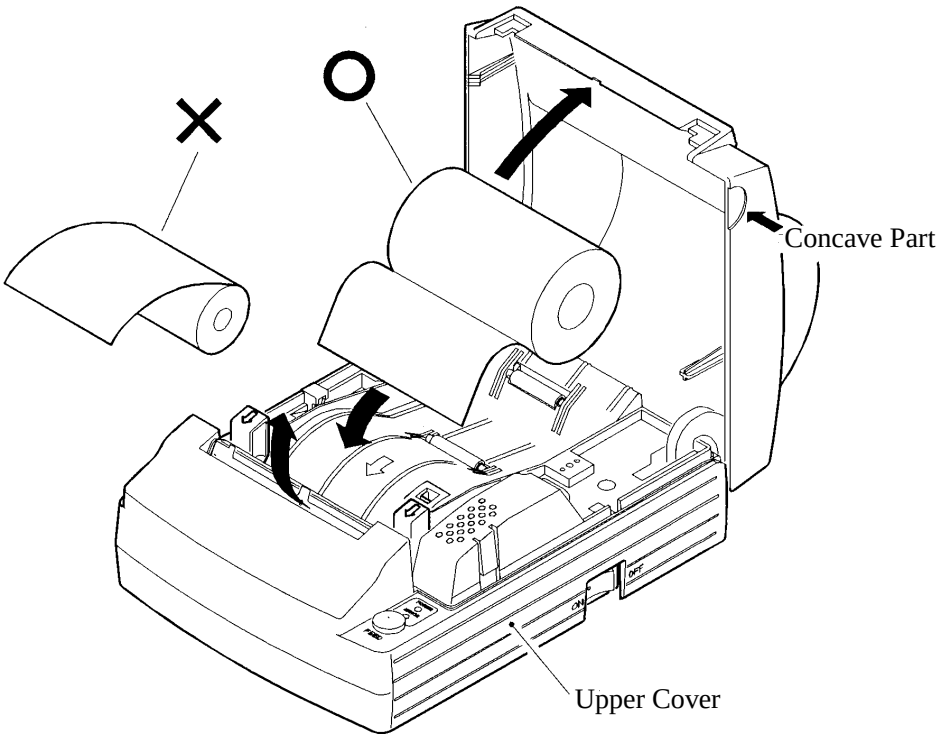
4.4.2 Manually Inserting the Paper

The manual insertion is effective when DIP switch DS1-2 is set to ON to disable the cover open detection.

1. Turn on the power.
2. Put your hands in the concave parts on both sides of the printer cover, and open it until it comes to a stop.
3. Cut the end of the paper roll at close to a right angle.



4. Ensure that the paper roll is placed correct side up in the roller part in the upper cover.
5. Insert the end of paper roll straight between the platen roller and the printing head.
6. The paper is automatically pulled into the platen roller and fed to the auto cutter (and comes out of the paper outlet of the cutter a little).
7. When the printer cover is closed, the paper is fed in a few more lines, cut, and printing is then possible. Remove cut paper before printing.



⚠ CAUTION:

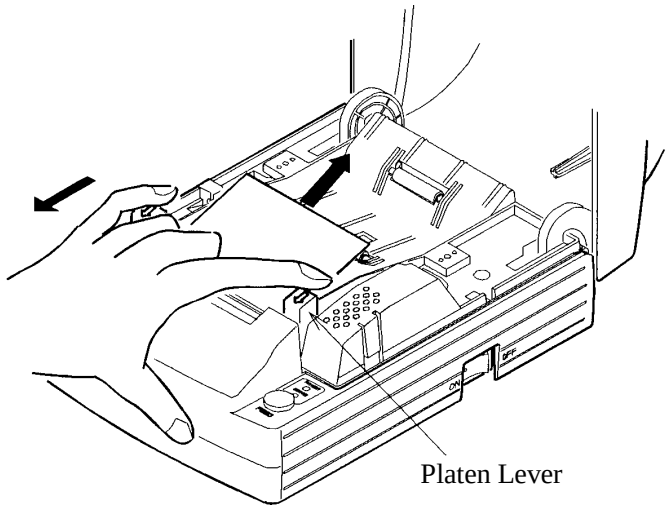
- Be sure to use the specified paper roll.
- Use of non-specified paper may not guarantee the print quality, printing head life, and so on.
- The printer cover is not detachable. Do not apply an excessive force beyond its stopping position.
- Do not insert a ragged or dog-eared end of the paper roll, because it could result in a paper jam or insertion error.
- Rewind the paper roll if the paper is slack. If there is too much slack in the paper roll, since the paper roll is apart from the paper sensor, the printer may perform the operation described in 6. and 7. in 4.4.2 "Manually Inserting the Paper."
- If the paper roll is skewed, pull the platen lever forward to correct its position.
- When the paper roll has been set in place, the end of the paper may be fed from the paper outlet in a folded or creased condition. If the paper does not appear at the paper outlet, check the end of the paper and set it in place again.
- Do not open the printer cover while printing.
- Holding or touching the paper roll during printing may result in a paper jam.
- When the auto cutter is used for full cutting, remove the cut paper before starting the next print operation to prevent jamming.

4.5 How to Remove Remaining Paper Roll

1. Open the printer cover.
2. Pull both platen levers in the direction of the arrow. The platen roller is then separated from the printing head and the paper may then be removed.

⚠ CAUTION:

- When removing the paper (in either the forward or reverse direction), pull the platen levers in the direction of the arrow.

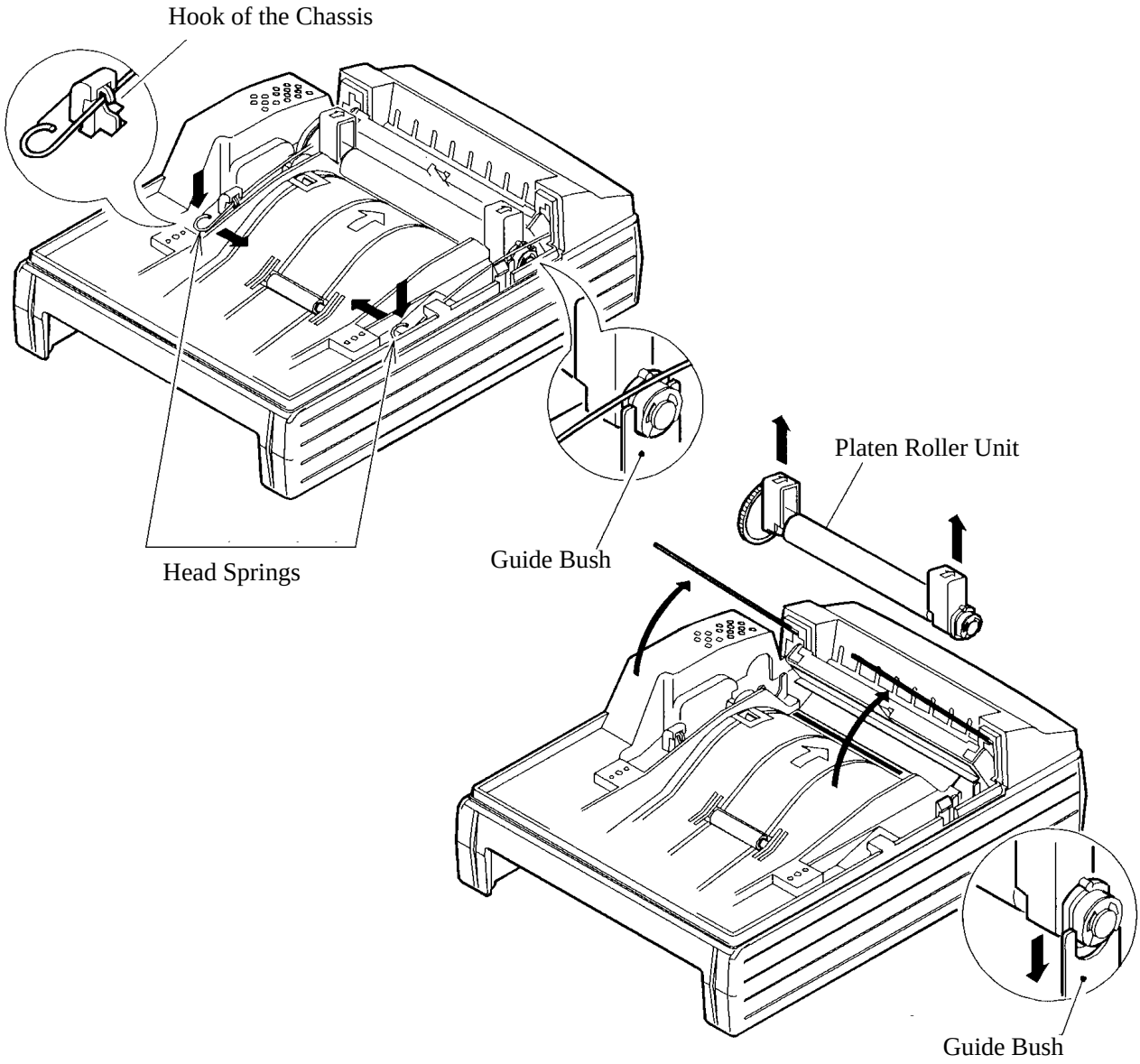


4.6 Eliminating the Paper Jam

1. Turn off the power.
2. Open the printer cover.
3. Cut the paper roll near the paper insertion slot.
4. Move the head springs on either side in the directions of the arrows to unhook them from the hook part of the chassis, and lift them. (See the figure on the next page.)
5. Remove the platen roller unit by lifting both platen levers.
6. Remove the remaining paper roll completely from the paper passage.
7. Check the direction of the platen roller unit and attach it so that its left end is securely engaged with the bush guide of the chassis as shown in the figure.
8. While lightly holding the platen unit, hook the head springs on the hooks.

⚠ CAUTION:

- Do not carry out this work just after printing because the printing head is very hot.
- Do not move the head springs beyond the movable limits.
- When eliminating remaining paper, do not touch the heating surface of the head with a bare hand or metal piece.
- When putting back the platen roller unit, be sure to confirm that it is correctly reattached.
- Always turn off the power before removing the platen roller unit.

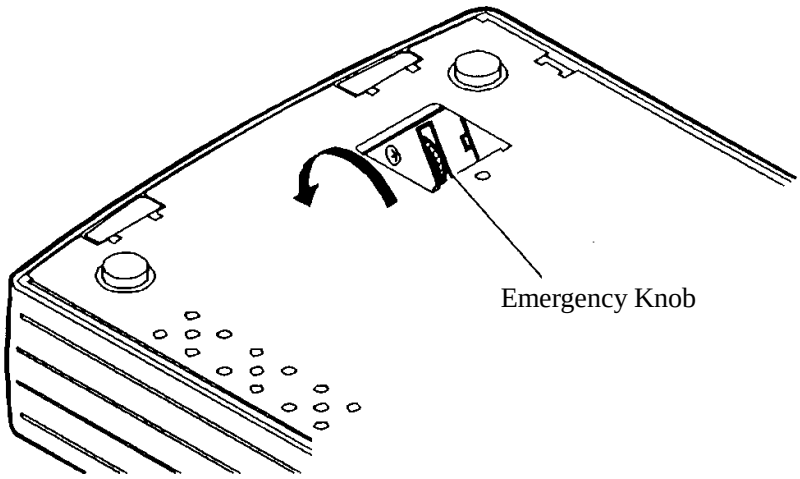

Hook of the Chassis
Head Springs
Guide Bush
Platen Roller Unit
Guide Bush

4.7 Unlocking the Cutter

1. Remove the paper from the paper passage as described in 4.6 "Eliminating the Paper Jam."
2. Turn on the power. The auto cutter initialization begins and the cutter returns to its home position. Then, the alarm is cleared.
3. If the cutter does not return to its home position after the power has been turned on, do the following. Turn off the power, and return the auto cutter blade to its home position by turning the emergency knob on the bottom of the auto cutter in the direction indicated by the arrow, using tweezers, screwdrivers, etc.
4. With tweezers or similar, totally remove remaining paper from the cutter blade area.

⚠ CAUTION:

- Do not carry out this work just after printing because the printing head is very hot.
- When eliminating remaining paper, do not touch the heating surface of the head with a bare hand or metal piece.
- The cutter is enabled/disabled with the DIP switch. When using the printer with the cutter disabled, be sure that the cutter has returned to the home position. If it is not, return it to the home position by turning the emergency knob on the bottom of the printer.

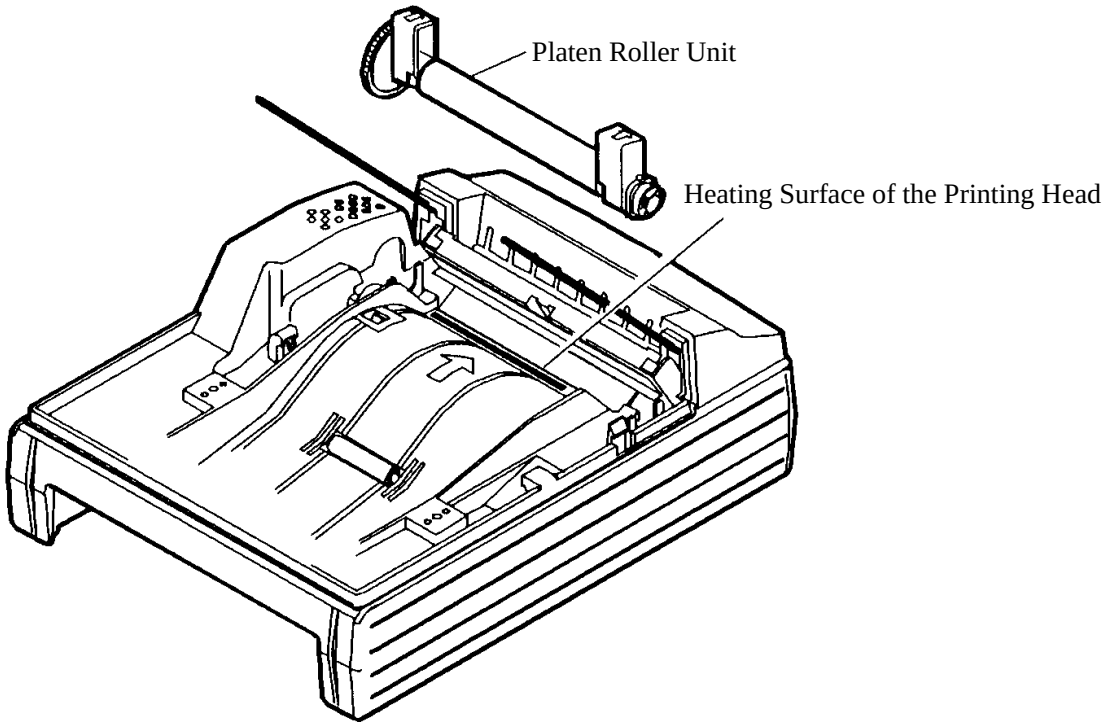


4.8 Cleaning the Head

1. Remove the platen roller unit referring to 4.6 "Eliminating the Paper Jam."
2. Clean the heating surface of the head by wiping it with a cotton swab dampened with a small amount of ethyl alcohol.
3. Attach the platen roller unit.

⚠ CAUTION:

- Do not touch the heating surface of the head with a bare hand or metal.
- Do not carry out this work just after printing because the printing head is very hot.
- Always turn off the power before removing the platen roller unit.



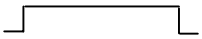
4.9 Operation Panel and Display of Error

1. POWER lamp (Green)

   Illuminated if the power is turned on. Also, flashes to indicate a memory error.

2. ERROR lamp (Red)

   Indicates an error by illuminating or blinking the lamps.

Error	POWER Lamp	ERROR Lamp	Reset
Memory check error	Quick blinking	ON	Cannot be reset
Cover open	ON	ON	Close the cover.
Head overheat	ON		Automatically reset by a temperature drop
Paper near end	ON	ON	Set a new paper roll after a print stop.
Paper end	ON	ON	Set a new paper roll.
Cutter motor lock	ON	Quick + Slow blinking	Eliminate a paper jam.
Macro execution wait	ON	Slow blinking	Press the FEED switch.

<Error Details>

Cover open ----- Opening of the printer cover is detected by the printer cover open sensor. The ERROR lamp is then lit and print operation is halted. Note that the DIP switch may be set to allow paper feed while the printer cover is open.

Head overheat ----- If the temperature of the printing head rises (about 65°C or more), in order to protect it against overheating, a printing head temperature sensor will be activated to stop printing. If the temperature drops (about 60°C), printing will be automatically resumed.

Paper near end ----- When the paper roll reaches a set diameter, the ERROR lamp is lit by the paper near end sensor located on the side of the roller part of the upper cover. (See the function of the control codes ESC c3 and ESC c4 in "PRINT CONTROL FUNCTION.")

Paper end ----- When the paper roll runs out, the paper sensor located in the paper path near the printing head detects paper end and the ERROR lamp is lit, resulting in halting printing. (See the function of the control codes ESC c3 and ESC c4 in "PRINT CONTROL FUNCTION.") When paper is inserted into the paper path, loading of the paper roll begins.

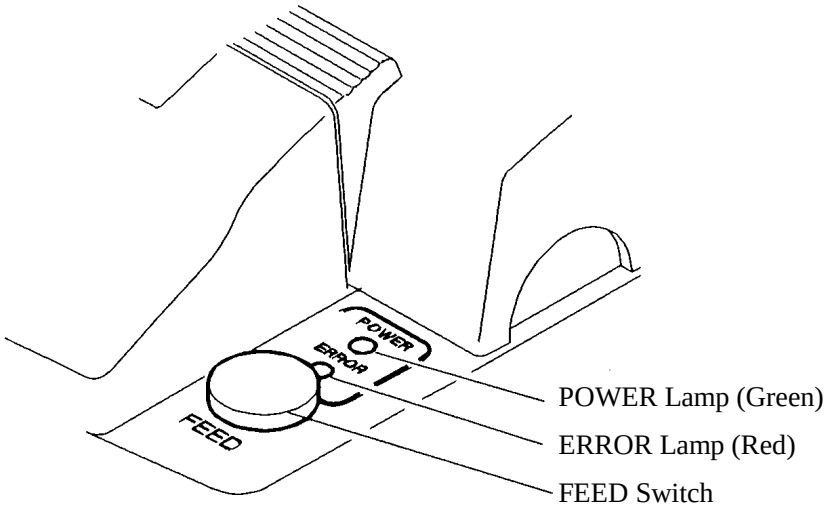
Cutter motor lock ----- If the cutter position sensor in the cutter unit is left turned on or off for approx. 1 second while the cutter motor is running, cutter operation and printing will be suspended, determining it to be motor lock. See 4.7 "Unlocking the Cutter."

3. FEED switch

   Press and release this switch immediately to feed paper by one line. Press it continuously to feed paper continuously. Press this switch to execute macro when the system is awaiting macro-execution.

4. FEED and Power Switches

   Press the FEED and POWER switches simultaneously to run self-print.



4.10 Hexadecimal Dumps

1. The Hexadecimal Dump Function

   This function allows data sent from the host to be printed in hexadecimal notation, together with a corresponding character printout.

2. Starting the Hexadecimal Dump

   Press the POWER switch and FEED switch simultaneously with the cover opened. When the cover is closed, "Hexadecimal Dump" is printed on the paper and the received data is then printed in hexadecimal format with the corresponding character printout.

   Notes: • "." is printed when the data has no corresponding character.
   • Only the DLE EOT and DLE ENQ commands are usable during the hexadecimal dump.
   • When less than one line of data is available for printing, pressing the FEED switch prints a single line.

3. Terminating the Hexadecimal Dump

   After the data has been printed, printing is terminated by either turning off the power, or by receipt of a reset signal.

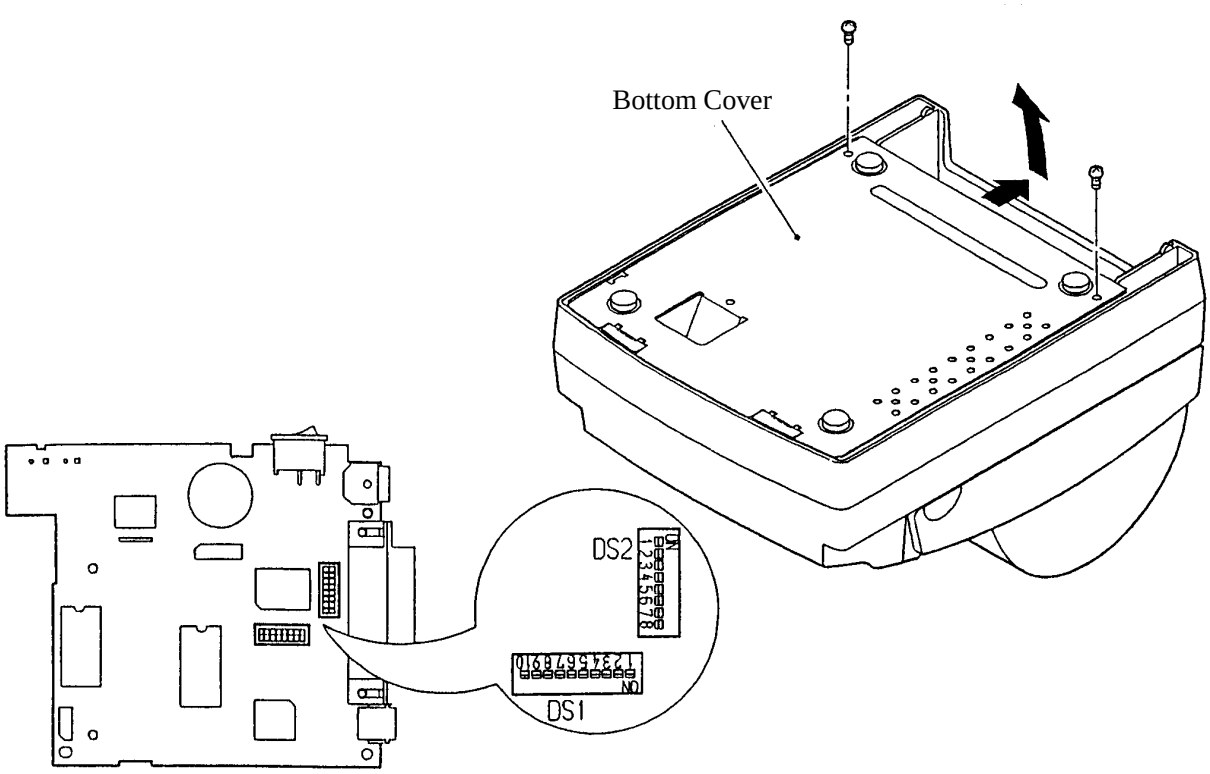
<Print Example>

```
=== Hexadecimal Dump ===
1B 21 00 1B 20 04 41 42 43 44   .!.. .ABCD
45 46 47 48 49 4A 4B 4C 4D 4E   EFGHIJKLMN
4F 50 0D 0A 31 32 33 34 35 36   OP..123456
0D 0A                           ..
```

5. DIP SWITCH SETTING

5.1 Location of DIP Switch

1. Turn off the power.
2. Remove the bottom cover by removing the two screws and turning it over in the direction shown by the arrow to remove it.



5.2 DIP Switch Function

DS1

No.	Function	ON	OFF	Upon Shipment
1	Cutter	Enabled	Disabled	ON
2	Cover open	Disabled	Enabled	OFF
3	CR switching	LF operation	Ignored	OFF
4	Kanji code selection	S-JIS	JIS	OFF
5	Input buffer	72 bytes	4 K bytes	ON
6	International character	See Table 1.		OFF
7	"			OFF
8	"			OFF
9	Print density	See Table 2.		ON
10	"			OFF

When DS1-2 "Cover open" is disabled, paper feed is possible with the cover open and paper insertion method will be changed from auto to manual insertion.

DS2 (For Serial Interface Only)

No.	Function	ON	OFF	Upon Shipment
1	Bit length	7 bits	8 bits	OFF
2	Parity	Yes	No	OFF
3	Odd/Even	Even	Odd	OFF
4	Communication mode	XON/XOFF	DTR/DSR	OFF
5	Baud rate	See Table 3.		OFF
6	"			ON
7	"			ON
8	Unused	—		

Table 1 International character

	USA	France	Germany	U.K.	Denmark-I	Sweden	Italy	Japan
DS1-6	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DS1-7	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DS1-8	OFF	OFF	OFF	OFF	ON	ON	ON	ON

Table 2 Print density

	Level 1	Level 2	Level 3	Level 4
DS1-9	OFF	ON	OFF	ON
DS1-10	OFF	OFF	ON	ON

Table 3 Baud rate

	150	300	600	1200	2400	4800	9600	19200
DS2-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DS2-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DS2-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON

6. PARALLEL INTERFACE

6.1 Bi-directional Parallel Interface (IEEE 1284)

6.1.1 Compatibility Mode (Host → Printer Communication Using the Centronics Interface)

(1) Outline

The familiar Centronics interface is used in the Compatibility mode.

(2) Specifications

Data transfer	:	8-bit parallel
Synchronization	:	External nStrobe signal
Handshaking	:	nAck and Busy signals
Signal level	:	All signals TTL compatible
Connector	:	57LE-40360 or equivalent (IEEE, 1284 Type B)

6.1.2 Reverse Mode (Printer → Host Communication)

Status data may be transferred from the printer to the host in either the Nibble or Byte mode.

Outline:

It is assumed that data is transferred from an asynchronous printer controlled from the host.

The existing control lines are used in transferring data in the Nibble mode (transferred in 4-bit units (nibbles)). Data is transferred in both directions on 8 data lines in the Byte mode (8-bit units (bytes)).

As simultaneous execution with the Compatibility mode is not possible, half-duplex communication is employed. See Appendix 2 for details.

6.1.3 Connector Pin Assignment

NC: Non connection

Pin No.	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	nStrobe	HostClk	HostClk
2	Host/Printer	Data0(LSB)	Data0(LSB)	Data0(LSB)
3	Host/Printer	Data1	Data1	Data1
4	Host/Printer	Data2	Data2	Data2
5	Host/Printer	Data3	Data3	Data3
6	Host/Printer	Data4	Data4	Data4
7	Host/Printer	Data5	Data5	Data5
8	Host/Printer	Data6	Data6	Data6
9	Host/Printer	Data7(MSB)	Data7(MSB)	Data7(MSB)
10	Printer	nAck	PtrClk	PtrClk
11	Printer	Busy	PtrBusy/Data3.7	PtrBusy
12	Printer	PError	AckDataReq/Data2.6	AckDataReq
13	Printer	Select	XFlag/Data1.5	XFlag
14	Host	nAutoFd	HostBusy	HostBusy
15		(NC)	(Undefined)	(Undefined)
16		GND	GND	GND
17		FG	FG	FG
18	Printer	Logic-H	Logic-H	Logic-H
19		GND	GND	GND
20		GND	GND	GND
21		GND	GND	GND
22		GND	GND	GND
23		GND	GND	GND
24		GND	GND	GND
25		GND	GND	GND
26		GND	GND	GND
27		GND	GND	GND
28		GND	GND	GND
29		GND	GND	GND
30		GND	GND	GND
31	Host	nInit	nInit	nInit
32	Printer	nFault	nDataAvail/Data0.4	nDataAvail
33		GND	(Undefined)	(Undefined)
34	Printer	DK_STATUS	(Undefined)	(Undefined)
35	Printer	+5V	(Undefined)	(Undefined)
36	Host	nSelectIn	IEEE 1284 Active	IEEE 1284 Active

- "n" before the signal indicates that it is "L" active.
- Bi-directional communication is impossible if any one of the above signals is absent.
- Always use twisted-pair cables for signal lines, and connect return lines to signal ground.
- Ensure that the interface employs TTL level signals with the following mentioned characteristics, and that signal rise and fall times are 0.5 µsec.
- Ignoring nAck and Busy signals while transferring data may result in loss of data.
- Ensure that the interface cable is of the minimum length possible.

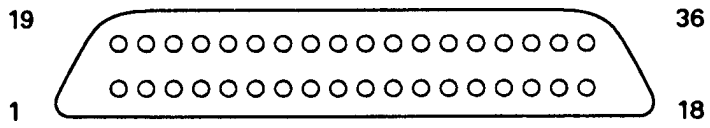
6.2 Parallel Interface (CENTRONICS)

6.2.1 Specifications

- Data input system : 8-bit parallel (DATA1 to DATA8)
- Control signals : $\overline{\text{ACK}}$, BUSY, $\overline{\text{STB}}$, $\overline{\text{FAULT}}$, PE, $\overline{\text{RESET}}$, SELECT, AUTO FEED, SELECT IN
- Applicable connectors : Printer side : 57LE-40360 (Anphenol) or its equivalent
  Cable side : 57-30360 (Anphenol) or its equivalent

6.2.2 Connector's Pin Configuration

No.	Signal Name	No.	Signal Name
1	$\overline{\text{STROBE}}$	19	TWISTED PAIR GND
2	DATA 1	20	↑
3	DATA 2	21	↑
4	DATA 3	22	↑
5	DATA 4	23	↑
6	DATA 5	24	↑
7	DATA 6	25	↑
8	DATA 7	26	↑
9	DATA 8	27	↑
10	$\overline{\text{ACK}}$	28	↑
11	BUSY	29	↑
12	PE	30	↑
13	SELECT	31	$\overline{\text{RESET}}$
14	AUTO FEED	32	$\overline{\text{FAULT}}$
15		33	GND
16	GND	34	Drawer Switch Output
17	FRAME GND	35	+5V DC
18		36	SELECT IN



6.3 Input and Output Signals

6.3.1 Input and Output Signals

(1) Input signals to the printer

- DATA : 8-bit parallel signal (Active High)
- $\overline{\text{STROBE}}$: Strobe signal to read the 8-bit data (Active Low)
- $\overline{\text{RESET}}$: Signal to reset the entire printer (Active Low); 1 ms or more

(2) Output signals from the printer

- $\overline{\text{ACK}}$: 8-bit data request signal. A pulse signal to be output at the end of the BUSY signal (Active Low)
- BUSY : Signal to indicate that the printer is busy. Input new data when it is "Low." (Active High)
- $\overline{\text{FAULT}}$: Turned to "Low" when the printer has an alarm. At this time, all the control circuits in the printer stop. (Active Low)
- PE : Output if the printing paper has run out or is running out. (Active High)
- Drawer Switch Output:

  When connecting a drawer, turned to "High" if the switch is open. Turned to "Low" if the switch is closed.

(3) Power source and the related

- GND : Common ground for the circuits

6.3.2 Electrical Characteristics

(1) Input signal level

The $\overline{STB}$ and DATA1-8 input signals are at the C-MOS level. Other input signals are at the TTL level.

C-MOS Level:

High level --- 4.0 V at minimum

Low level ---- 1.0 V at maximum

TTL Level:

High level --- 2.0 V at minimum

Low level ---- 0.8 V at maximum

(2) Output signal level

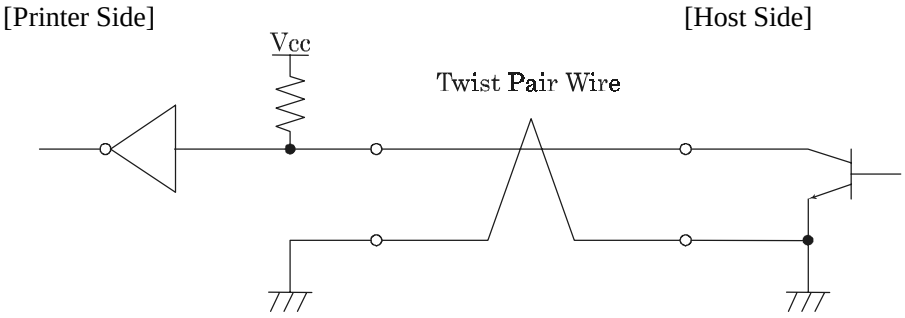
All the output signals are at the C-MOS level.

High level --- 2.4 V at minimum

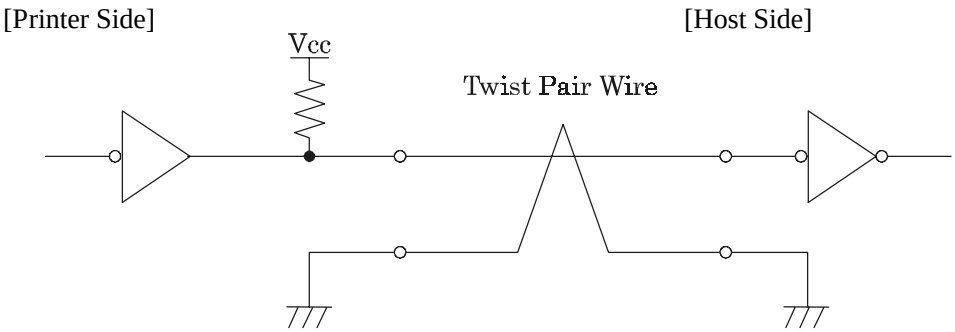
Low level ---- 0.4 V at maximum

(3) Input and output conditions

The DATA1-8 input signals are pulled up at 50kΩ, and the other input signals at 50kΩ.

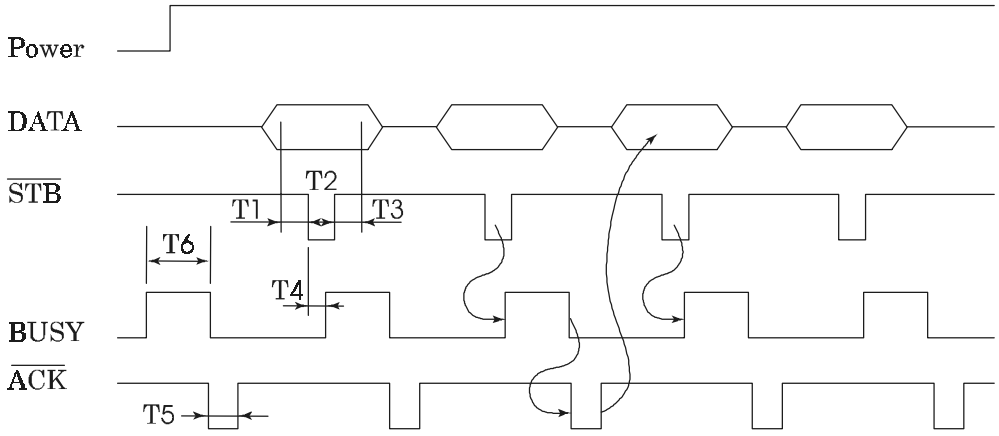


The DATA1-8 output signals are pulled up at 50kΩ and the other output signals 3.3kΩ.



6.3.3 Timing Chart (Compatibility Mode)

Data Input and Print Timings



T_1, T_2, T_3	0.5 µs MIN
T_4	270 ns MAX
T_5	2.3 µs TYP
T_6	500 ms MIN (At power-on)

6.3.4 Data Receiving Control

The data can be received from the host when the BUSY signal is at "Low," but cannot be received when it is "High."

6.3.5 Buffering

The host side is immediately freed, because 4 KB data can be buffered.

7. SERIAL INTERFACE

7.1 Specifications

(1) Synchronous system : Asynchronous

(2) Baud rate : 150, 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200 bps
(Selected by the user)

(3) 1-word configuration

Start bit : 1 bit

Data bits : 8 bits or 7 bits (Selected by the user)

Parity bit : Odd, even, or no parity (Selected by the user)

Stop bit : 1 bit or more

(4) Signal polarity

RS-232C

• Mark = Logic "1" (-3 ~ -12 V)

• Space = Logic "0" (+3 ~ +12 V)

(5) Received data (RD signal)

• Mark = 1

• Space = 0

(6) Reception control (DTR signal)

• Mark : Data not transferable

• Space : Data transferable

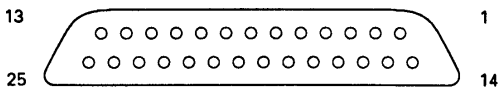
(7) Transmission control (TD signal)

• DC1 code(11H) X-ON : Data receivable

• DC3 code(13H) X-OFF : Data not receivable

7.2 Connector's Pin Configuration

No.	Signal Name	Input/Output	Function
1	FG	—	Frame Ground
7	GND	—	Signal Ground
3	RD	Input	Received Data
20	DTR	Output	Printer BUSY Signal
2	TD	Output	Transmitted Data
6	DSR	Input	Data Set Ready



Notes: 1. The RS-232C signals are based on the EIA RS-232C.

2. The received data should be always maintained in the Mark status when no data is being transferred.

Applicable connectors (D-Sub connectors)

Printer side : 17LE-13250 (DDK) or its equivalent

Cable side : 17JE-23250 (DDK) or its equivalent

7.3 Input and Output Signals

7.3.1 Input and Output Signals

(1) RD

Serial received data signal. If a framing error, overrun error, or parity error takes place, the relevant data will be printed as "?".

(2) DTR

Write the data or a command when this signal is Ready. If you write at Busy, the previous data will be ignored, resulting in an overrun error. The data can be written in the input buffer even during printing. Busy is also issued at power-on, during test printing, at on-line, or at reset.

(3) TD

If the remaining capacity of the input buffer comes to 128 bytes or less while receiving the data, DC3(13H) will be output as a data not receivable signal. If the remaining capacity comes to 256 bytes or more, DC1(11H) will be output to the host side as a data receivable signal.

When sending the status information, it is confirmed that DSR is a space prior to sending the data, if DTR/DSR control has been selected. If DTR/DSR control has not been selected, the data will be sent, ignoring the DSR signal.

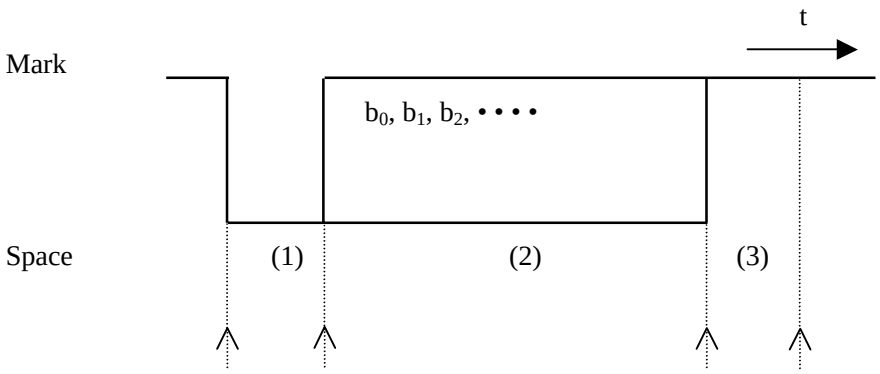
(4) FG

Ground for the case

(5) GND

Common ground for the circuits

7.3.2 Data Configuration



(1) Start Bit
(2) Data Bit (+ Parity Bit)
(3) Stop Bit (1 or More)

(1) Start bit

The system reads the status again after a lapse of 1/2 bit from a fall edge from the mark to space, and if it is a space, this bit will be recognized as the start bit.

If it is a mark, the system will not recognize the bit as the start bit and try to detect the start bit again without judging it as an error.

(2) Data bits + Parity bit

The system samples the data bits and parity bit for the 1 bit worth of time from 1/2 start bit and assumes the then status as the data for the relevant bits. The bits are called Bit 0, Bit 1, ..., Parity bit, counting from the one closest to the start bit.

(3) Stop bit

The stop bit is the Mark level of 1 bit or more. If a space is detected in detecting the stop bit, a framing error will result.

7.3.3 Error Detection

The system detects a parity, framing, or overrun error. If an error is detected, the relevant data will be stored in the buffer as "?".

(1) Parity error

With a parity check specified, if an error is detected at parity check time, the relevant data will be stored in the buffer as "?".

(2) Framing error

This error results if the Space status is detected at stop bit detection time. The relevant data will be stored in the buffer as "?".

(3) Overrun error

If an overrun error is detected, the relevant data will be stored in the buffer as "?".

7.3.4 Data Receiving Control

If DTR/DSR control has been selected, the data from the host side will be received when the BUSY signal is at "Low," but not received when at "High." If DTR/DSR has not been selected, the data from the host side will be received after sending XON, but not after sending XOFF.

7.3.5 Buffering

To transfer the data to the input buffer, there are two control signals available: DTR signal and TD signal. The host side is immediately freed, since the data can be buffered up to 4 KB.

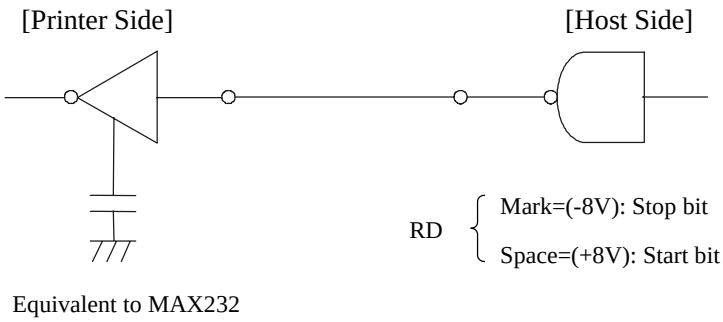
(1) DTR signal (See 7.3.1-(2))

(2) TD signal (See 7.3.1-(3))

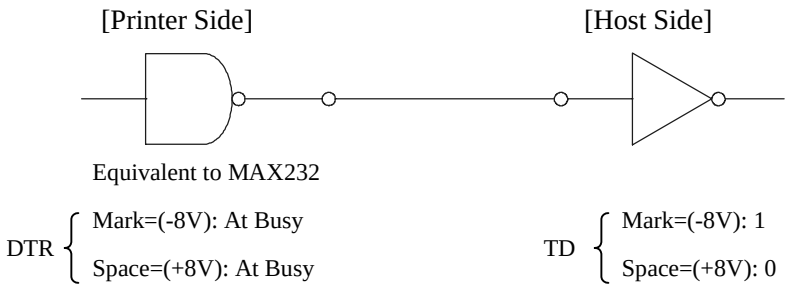
7.3.6 Electrical Characteristics

RS-232C Circuit

Input (RD, DSR)



Output (TD, DTR)



8. DRAWER KICK-OUT CONNECTOR, POWER CONNECTOR

8.1 Drawer Kick-Out Connector

8.1.1 Specifications of Drawer Kick-Out Connector

(1) Drawer kick-out drive signal

Outputs a pulse specified with ESC p. The status of SW (+) can be checked with pin 34 on the parallel interface connector, or with the DLE EOT, GS a, and GS r commands through the serial/parallel interface.

(2) Electrical characteristics

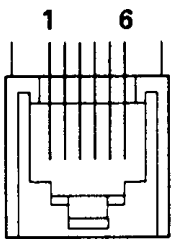
1) Drive voltage: 24 V DC

2) Drive current: 0.8 A at maximum (Within 510 ms)

3) Switch signal level: "L" = 0 to 0.5 V, "H" = 3 to 5 V

8.1.2 Connector's Pin Configuration

No.	Signal	Function
1	FG	Frame Ground
2	DRAWER 1	Drawer 1 drive signal
3	DRSW	Drawer switch input
4	VDR	Drawer drive power
5	DRAWER 2	Drawer 2 drive signal
6	GND	Common ground on the circuit

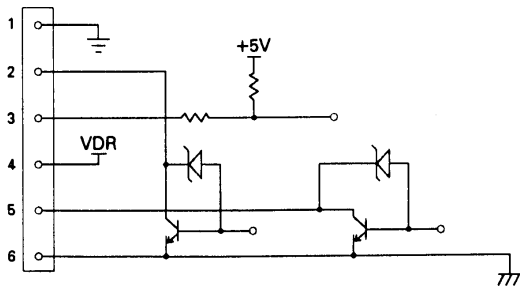


Connector used : TM5RJ3-66 (Hirose) or its equivalent

Applicable connector : TM3P-66P (Hirose) or its equivalent

⚠ **CAUTION** :
- No output is made while printing.
- The drawers 1 and 2 cannot be driven simultaneously.
- A solenoid used for the drawer should be of 36Ω or more. An output current should be kept below 0.8 A. Use beyond this limit cannot be assured.
- This connector cannot be connected to a telephone line. Do not connect other than the solenoid.

8.1.3 Drive Circuit

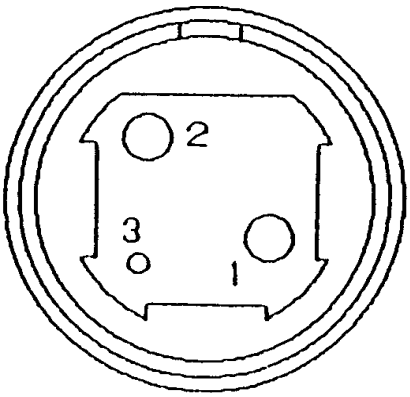


8.2 Power Connector

This connector is to supply the power from the special AC adapter.

Connector's Pin Configurations

No.	Function
1	+24V
2	GND
3	N.C
SHELL	FG



Connector used : TCS7960-53-2010 (Made by HOSHIDEN) or its equivalent

Applicable connector : TCP8927-63-1100 (Made by HOSHIDEN) or its equivalent

TCP8927-53-1100 (Made by HOSHIDEN) or its equivalent

⚠ CAUTION:

- Be sure to use the specified AC adapter. Use of any other power source could cause trouble to or break the printer.
- Do not connect the power source with different polarity.
- After using the printer or when not using it for a long period of time, be sure to unplug the AC adapter from a plug socket for your safety.

9. MAINTENANCE AND SERVICE

For the information on maintenance and service, please contact our dealer or at the following address.

Northern America
CBM America Corporation
Service Center
363 Van Ness Way
Suit 404
Torrance, CA 90501, U.S.A

TEL +1-310-781-1460
FAX +1-310-781-9157

Other Areas
Japan CBM Corporation
Information Systems Division
CBM Bldg., 5-68-10, Nakano
Nakano-ku, Tokyo 164-0001
Japan

TEL +81-3-5345-7540
FAX +81-3-5345-7541

10. PRINT CONTROL FUNCTIONS

10.1 Command List

No.	Command	Function	Mode	Code	Page
1	HT	Horizontal tab	S,P	09H	40
2	LF	Printing and paper feed	S,P	0AH	41
3	CR	Printing	S,P	0DH	41
4	FF	Printing in Page mode and returning to Standard mode	P	0CH	42
5	CAN	Canceling print data in Page mode	P	18H	42
6	DEL EOT	Sending status in real time	S,P	16H 04H n	43
7	DLE ENQ	Real-time request to printer	S,P	10H 05H n	46
8	ESC FF	Printing data in Page mode	P	1BH 0CH	47
9	ESC SP	Setting the right spacing of the character	S,P*	1BH 20H n	47
10	ESC !	Collective specifying the printing mode	S,P	1BH 21H n	49
11	ESC $	Specifying the absolute positions	S,P*	1BH 24H n1 n2	51
12	ESC %	Specifying/Canceling download character set	S,P	1BH 25H n	52
13	ESC &	Defining the download characters	S,P	1BH 26H s n m [a p1 p2…ps×a] m-n+1	53
14	ESC *	Specifying the bit image mode	S,P	1BH 2AH m n1 n2 [d]k	54
15	ESC –	Specifying/Canceling underline	S,P	1BH 2DH n	56
16	ESC 2	Specifying 1/6-inch line feed rate	S,P*	1BH 32H	57
17	ESC 3	Setting line feed rate of minimum pitch	S,P	1BH 33H n	58
18	ESC =	Data input control	S,P	1BH 3DH n	59
19	ESC ?	Deleting downloaded characters	S,P	1BH 3FH n	60
20	ESC @	Initializing the printer	S,P	1BH 40H	60
21	ESC D	Setting horizontal tab position	S,P	1BH 44H [n]k 00H	61
22	ESC E	Specifying/Canceling highlighting	S,P	1BH 45H n	62
23	ESC G	Specifying/Canceling double printing	S,P	1BH 47H n	63
24	ESC J	Printing and feeding paper in minimum pitch	S,P*	1BH 4AH n	64
25	ESC L	Selecting Page mode	S	1BH 4CH n	65
26	ESC R	Selecting the international character set	S,P	1BH 52H n	66
27	ESC S	Selecting Standard mode	P	1BH 53H n	67
28	ESC T	Selecting the character printing direction in Page mode	P	1BH 54H n	68

In the Mode column: S = Standard Mode, P = Page Mode

* shows the command affected by GS P.

No.	Command	Function	Mode	Code	Page
29	ESC V	Specifying/Canceling 90°-right-turned characters	S	1BH 56H n	69
30	ESC W	Defining the print area in Page mode	P*	1BH 57H xH yH dxL dxH dyL dyH	70
31	ESC ¥	Specifying the relative position	S,P*	1BH 5CH nL nH	72
32	ESC a	Aligning the characters	S,P	1BH 61H n	73
33	ESC c 3	Selecting the paper near end sensor valid for a paper end signal output	S,P	1BH 63H 33H n	74
34	ESC c 4	Selecting the paper near end sensor valid for print stop	S,P	1BH 63H 34H n	74
35	ESC c 5	Enabling/Disabling the panel switches	S,P	1BH 63H 35H n	75
36	ESC d	Printing and feeding the paper by n lines.	S,P	1BH 64H n	75
37	ESC i	Full cut	S,P	1BH 69H	76
38	ESC m	Partial cut	S,P	1BH 6DH	77
39	ESC p	Generating the specified pulses	S,P	1BH 70H m n1 n2	78
40	ESC t	Selecting the character codes table	S,P	1BH 74H n	79
41	ESC {	Specifying/Canceling the inverted characters	S	1BH 7BH n	80
42	GS !	Specifying the character size	S,P	1DH 21H n	81
43	GS $	Specifying the absolute vertical position of characters in Page mode	P*	1DH 24H nL nH	83
44	GS *	Defining the download bit image	S,P	1DH 2AH n1 n2 [d] n1×n2×8	84
45	GS /	Printing the downloaded bit image	S,P	1DH 2FH m	86
46	GS :	Starting/Ending macro definition	S,P	1D>H<3AH	87
47	GS B	Specifying/Canceling the black/white inverted printing	S,P	1DH 42H n	88
48	GS H	Selecting of printing position of HRI characters	S,P	1DH 48H n	89
49	GS I	Sending the printer I	S,P	1DH 49H n	90
50	GS L	Setting the left margin	S*	1DH 4CH nL nH	91
51	GS P	Specifying the basic calculation pitch	S,P	1DH 50H x y	92
52	GS V	Cutting the paper	S,P	1DH 56H m	93
53	GS W	Setting the print area width	S,P	1DH 57H nL nH	94
54	GS ¥	Specifying the relative vertical position of a character in Page mode	S,P	1DH 5CH nL nH	96
55	GS ^	Executing the macro	S,P	1DH 5EH n1 n2 n3	97
56	GS a	Enabling/Disabling ASB (Automatic Status Back)	S,P	1DH 61H n	98

In the Mode column: S = Standard Mode, P = Page Mode

* shows the command affected by GS P.

No.	Command	Function	Mode	Code	Page
57	GS f	Selecting the font of HRI charactetrs	S,P	1DH 66H n	101
58	GS h	Specifying the height of the bar code	S,P	1DH 68H n	102
59	GS k	Printing the bar code	S,P	1DH 6BH m n [d1 .... dn]	103
60	GS r	Sending status	S,P	1DH 72H n	109
61	GS w	Specifying the horizontal size (magnification) of bar code	S,P	1DH 77H n	111

In the Mode column: S = Standard Mode, P = Page Mode

* shows the command affected by GS P.

10.2 Command Details

10.2.1 Descriptions of Each Item

XXXXX

[Function]	Command Function
[Code]	A sequence of code constituting a command is represented in hexadecimal number for < >H, binary number for < >B, and decimal number for < >, respectively; [ ]k represents a repeat count of k-times.
[Range]	Describes an argument value(Setting range) for the command.
[Outline]	Describes a command outline.
[Caution]	Describes a caution as required.
[Default]	Describes an initial value for the command when accompanied by an argument.
[See Also]	Describes the associated commands for use.
[Sample Program]	Describes a coding example in the Q-BASIC sample program. This example is only for your reference and differs depending on the language used, version, and so on. For details, see the manual for the language used.
[Print Result]	Shows a print result obtained by running the above-mentioned program. However, the print result shown here has a different scale from the actual print result.
XXXX	Represents the command.

10.2.2 Command Details

HT

[Function] Horizontal tab

[Code] <09> H

[Outline] Shifts the printing position to the next horizontal tab position.

• Ignored when the next horizontal tab position has not been set.

[Caution] • The horizontal tab position is set by ESC D.

• Initial setting of the horizontal tab position is each 8 characters in 9th, 17th, 25th, 33rd, and 41st columns.

[See Also] ESC D

[Sample Program]

```
LPRINT "012345678901234567890" ;
LPRINT CHR$ (&HA) ;
LPRINT CHR$ (&H9) ; "AAA" ;
LPRINT CHR$ (&H9) ; "BBB" ;
LPRINT CHR$ (&HA);
LPRINT CHR$ (&H1B) ; "D" ;
LPRINT CHR$ (3) ; CHR$ (7) ; CHR$ (14) ; CHR$ (0) ;
LPRINT CHR$ (&H9) ; "AAA" ;
LPRINT CHR$ (&H9) ; "BBB" ;
LPRINT CHR$ (&H9) ; "CCC" ; CHR$ (&HA) ;
END
```

[Print Results]

```
01234567890123456789 0
        AAA     BBB     <---- Initially set horizontal tab
AAA BBB     CCC         <---- When set to the 4th, 8th, and 15th digits
```

LF

Function] Printing and paper feed

[Code] <0A>H

[Outline] Prints data inside the input buffer and feeds lines based on the line feed amount having been set.

• The head of the line becomes the next print starting position.

[See Also] ESC 2, ESC 3

[Sample Program]

```
LPRINT "AAA" ; CHR$ (&HA) ;
LPRINT "BBB" ; CHR$ (&HA) ;
LPRINT CHR$ (&HA) ;
LPRINT "CCC" ; CHR$ (&HA) ;
END
```

[Print Results]

```
AAA   <-- Print and line feed
BBB   <-- Print and line feed
      <-- Line feed only
CCC   <-- Print and line feed
```

CR

[Function] Printing

[Code] <0D>H

[Outline] 1) When DSW1-3 is OFF:
This command is ignored.

2) When DSW1-3 is ON:
With data held inside the internal print buffer, printing and line feed are performed.
Without data inside the internal print buffer, however, no printing is performed.

[See Also] LF

[Sample Program]

```
LPRINT "AAA" ; CHR$ (&HD) ;
LPRINT "BBB" ; CHR$ (&HD) ;
LPRINT CHR$ (&HD) ;
LPRINT "CCC" ; CHR$ (&HD) ;
END
```

[Print Results]

When DSW1-3 is OFF

```
AAABBBCCC
```

When DSW1-3 is ON

```
AAA   <-- Print and line feed
BBB   <-- Print and line feed
      <-- Line feed only
CCC   <-- Print and line feed
```

FF

[Function] Printing in Page mode and returning to Standard mode

[Code] <0C>H

[Outline] Executes a batch printout of the data mapped in the print area, and then returns to Standard mode.

[Caution]
- All mapped data is erased after printout.
- The print area set up by ESC W is initialized.
- This command does not execute a paper cut.
- After this command is executed, the beginning of the line is taken as the start position for the next print.
- This command is only effective when the Page mode is selected.

[See Also] "Page Mode" in Appendix 1
ESC FF, ES L, ESC S

CAN

[Function] Canceling print data in Page mode

[Code] <18>H

[Outline] Erases all data contained in the currently effective print area in Page mode.

[Caution]
- This command is only effective when Page mode is selected.
- If the previously established print area overlaps the currently effective print area, the overlapped data in the previously established area will be erased.

[See Also] ESC L, ESC W, "Page Mode" in Appendix 1

DLE EOT n

[Function] Sending status in real time

[Code] <10>H<04>H<n>

[Range] 1 ≤ n ≤ 4

[Outline] Sends in real time the status specified by "n."

n = 1: Printer status

n = 2: Status caused by an offline condition

n = 3: Status caused by an error

n = 4: Paper detector status

[Caution]

- Each status represents the current status. It is 1-byte data.
- The status is transferred without checking whether the host is ready to receive or busy.
- This command is executed even if the printer is in offline state, receive-buffer full state, or error state.
- This command is dealed with when it is received.
- If another data string of <16>H<04>H<n> (1 ≤ n ≤ 4) is received, the printer acts the same way as with this command. Therefore, the user should be reminded of this fact.

[Example 1]

Suppose a command "ESC * m nL nH [d1 ... dk]," where d1 = <10>H, d2 = <04>H, d3 = <01>H.

- The DLE EOT n command cannot be interleaved into the code string of another command consisting of two bytes or more.

[Example 2]

If the printer sends DLE EOT 3 when the host has sent down to ESC 3 in its attempt to send ESC 3 n, the printer handles the ESC 3 as ESC 3 <10>H. Thus, the user should be cautious.

- If ASB (automatic status back) is enabled by GS a, it is necessary to discriminate between the status due to AS and the status due to this command.

(1) Printer status (when n = 1 is specified)

Bit	Status	Hex.	Decimal
0	Unused	00	0
1	Unused	02	2
2	Status of pin 3 of drawer kick connector = L	00	0
	Status of pin 3 of drawer kick connector = H	04	4
3	Online status	00	0
	Offline status	08	8
4	Unused	10	16
5	Undefined	—	—
6	Undefined	—	—
7	Unused	00	0

(2) Status caused by an offline condition (when n = 2 is specified)

Bit	Status	Hex.	Decimal
0	Unused	00	0
1	Unused	02	2
2	Cover closed	00	0
	Cover open	04	4
3	Not in paper feed state triggered by FEED switch	00	0
	In paper feed state triggered by FEED switch	08	8
4	Unused	10	16
5	Printing is not stopped because of "paper out" state	00	0
	Printing is stopped because of "paper out" state	20	32
6	Error not occurred	00	0
	Error occurred	40	64
7	Unused	00	0

Bit 5: Printing is stopped if the paper end detector detects a "paper out" state, or if the printer is out of paper when the paper near-end detection is enabled by ESC4. At this time, bit 5 = "1."

(3) Status caused by an error (when n = 3 is specified)

Bit	Status	Hex.	Decimal
0	Unused	00	0
1	Unused	02	2
2	Undefined	—	—
3	Auto cutter error not occurred	00	0
	Auto cutter error occurred	08	8
4	Unused	10	16
5	Unrecoverable error not occurred	00	0
	Unrecoverable error occurred	20	32
6	Auto recovery error not occurred	00	0
	Auto recovery error occurred	40	64
7	Undefined	00	0

Bit 3: If this error occurred because of a paper jam, for example, remove the cause of the error, and then DEL ENQ n ($1 \leq n \leq 2$) can be used to recover from the error. However, it is not possible to recover from any error due to a circuit problem (e.g., broken wire).

Bit 6: If a head overheat error is detected and the printing is stopped until the head temperature falls. At this time, bit 6 = "1."

(4) Paper detector status (when n = 4 is specified)

Bit	Status	Hex.	Decimal
0	Unused	00	0
1	Unused	02	2
2,3	Paper not found by paper near end detector	00	0
4	Unused	10	16
5,6	Paper found by paper end detector	00	0
	Paper not found by paper end detector	60	96
7	Unused	00	0

[See Also] DLE ENQ, GS a, and GS r, "Identification of Send Status" in Appendix 3

DLE ENQ n

[Function] Real-time request to printer

[Code] <10>H<05>H<n>

[Range] 1 ≤≤ n ≤ 2

[Outline] The printer responds in real time to the request that the host specified with number "n."

n = 1: After recovering from an error, the printer resumes printing from the beginning of the line where the error occurred.

n = 2: The printer clears the receive buffer and the print buffer, and then recovers from the error.

[Caution]
- This command is only effective if an auto cutter error has occurred.
- This command is dealt with when it is received.
- This command is also executed even if the printer is in a receive-buffer full state or error state.
- If another data string of <10>H<05>H<n> (1 ≤ n ≤ 2) is received, the printer acts in the same way as with this command. The user should, therefore, be reminded of this fact.

[Example 1]

If, for example, a command "ESC * m nL nH {d} k," where d1 = <10>H, d2 = <05>H, d3 = <01>H, is given, the DLE ENQ n command cannot be interleaved into the code string of another command consisting of two bytes or more.

[Example 2]
- If the printer sends DLE ENQ 2 when the host has sent down to ESC 3 in its attempt to send ESC 3 n, the printer treats the ESC 3 as ESC 3 <10>H. Thus, the user should be careful.
- When DEL ENQ 2 is executed, the settings made by, for example, ESC ! and ESC 3 remain the same as those in effect when the error occurred. A combined use of this command and ESC @ can completely initialize the printer.

[See Also] DLE EOT

ESC FF

[Function] Printing data in Page mode

[Code] <1B>H<0C>H

[Outline] Executes a batch printout of the data mapped in every print area in Page mode.

[Caution]
- This command is only effective when Page mode is selected.
- Mapped data, as well as the ESC T and ESC W settings, and the character mapping position are held even after printing.

[See Also] "Page Mode" in Appendix 1
FF, ESC L, ESC S

ESC SP n

[Function] Setting the right spacing of the character

[Code] <1B> H <20> H <n>

[Range] $0 \leq n \leq 32$

[Outline] Sets the right spacing of character to [n × basic calculation pitch] inches.

[Caution]
- If the horizontal magnification of character is 2 or more, the right spacing increases with the magnification.
- This command does not affect kanji characters.
- The right spacing can be set separately for the Standard and Page modes.
- The basic calculation pitch is set by GS P. Once defined, the right spacing is not changed if the basic calculation pitch is changed by GS P.
- Fractions resulting from calculation are corrected with the minimum pitch of the mechanism, and the remainder is omitted.
- In Standard mode, this command uses the horizontal basic calculation pitch (x).
- In Page mode, the basic calculation pitch used by this command depends on the start point:
  (1) If the start point specified by ESC T is top left or bottom right, the command uses the horizontal basic calculation pitch (x).
  (2) If the start point specified by ESC T is top right or bottom left, the command uses the vertical basic calculation pitch (y).
- The maximum settable right spacing is approximately 35.983 mm (255/180 inches). A setting greater than this maximum is trimmed to the maximum.

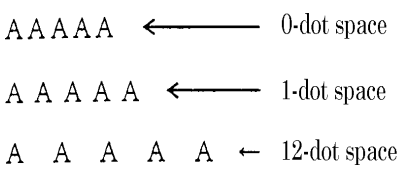
[Default] n = 0

[See Also] GS P

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "    " ; CHR$ (0) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "    " ; CHR$ (1) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "    " ; CHR$ (12) ;
LPRINT "AAAAA" ; CHR$ (&HA)
END
```

[Print Results]



ESC ! n

[Function] Collective specifying the printing mode

[Code] <1B> H <21> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Printing mode is assigned. Each "n" bit indicates the following:

Bit	Function	Value	
		0	1
0	Character Font	Font A	Font B
1	Undefined		
2	Undefined		
3	High-lighting	Canceled	Specified
4	Double height	Canceled	Specified
5	Double width	Canceled	Specified
6	Undefined		
7	Underline	Canceled	Specified

[Caution]
- With double height and double width being specified simultaneously, double wide and double high characters are consisted.
- An underline is attached to the full character width, which, however, is not attached to the part having been skipped by the horizontal tab. Neither is it attached to 90°-right-turned characters.
- The underline width is as having been specified by the "ESC –" command. (The default setting is 1 dot width.)
- Specification with this command is invalid to Kanji, except specification and cancellation of highlighting.
- In case that double wide character and normal character exist in same one line, the layout of underline is consistent one.

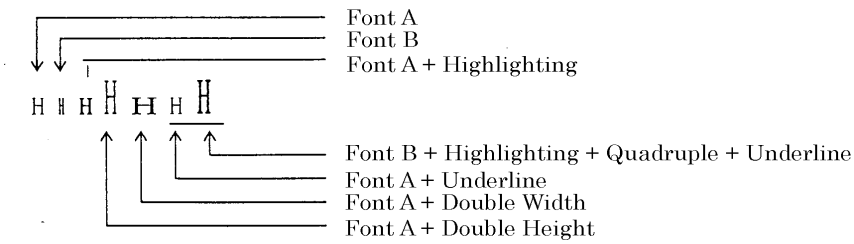
[Default] n = 0

[See Also] ESC E, ESC –, GS !

[Sample Program]

```
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H00) ; "H" ;
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H01) ; "H";
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H08) ; "H";
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H10) ; "H";
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H20) ; "H";
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H80) ; "H";
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&HB9) ; "H";
LPRINT CHR$ (&HA) ;
END
```

[Print Results]



ESC $ n1 n2

[Function] Specifying the absolute positions

[Code] <1B> H <24> H < n1> <n2>

[Range] 0 ≤ n1 ≤ 255

0 ≤ n2 ≤ 1

[Outline] The printing start position is specified in the number of dots (1/203 inch unit) from the beginning of line.

- The number of dots is divided by 256, whose quotient is taken as "n2" and the residual as "n1."
- Therefore, the printing start position is equal to n1 + n2 × 256 from the beginning of line.

[Caution] The basic calculation pitch is set by GS P. After the line feed width is set, if the basic calculation by GS P leaves a fraction, the fraction is corrected with the minimum pitch of the mechanism, and the remainder is omitted.

In Standard mode, this command uses the vertical (paper feed direction) basic calculation pitch (y).

In Page mode, this command acts differently depending on the start point:

(1) If the start point specified by ESC T is top left or bottom right, the command uses the vertical (paper feed direction) basic calculation pitch (y).

(2) If the start point specified by ESC T is top right or bottom left, the command uses the horizontal (perpendicular to the paper feed direction) basic calculation pitch (x).

Specification beyond the end of the line is ignored.

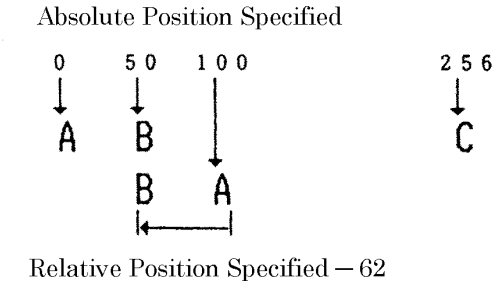
[Default] The initial value is not specified.

[See Also] ESC ¥, GS P, GS Y, GS $

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "$" ;
LPRINT CHR$ (0) ; CHR$ (0) ; "A" ;
LPRINT CHR$ (&H1B) ; "$" ;
LPRINT CHR$ (50) ; CHR$ (0) ; "B" ;
LPRINT CHR$ (&H1B) ; "$" ;
LPRINT CHR$ (0) ; CHR$ (1) ; "C" ;
LPRINT CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "$" ;
LPRINT CHR$ (100) ; CHR$ (0) ; "A" ;
LPRINT CHR$ (&H1B) ; "¥" ;
LPRINT CHR$ (&HC2) ; CHR$ (&HFF) ; "B" ;
LPRINT CHR$ (&HA) ;
END
```

[Print Results]



ESC % n

[Function] Specifying/Canceling download character set

[Code] <1B> H <25> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Specifying/canceling download characters.

Further, only the lowest bit (n0) is valid for n.

The lowest bit (n0) indicates the following.

n0	Function
0	Canceling download character set
1	Specifying download character set

[Caution] Download characters and download bit images cannot be defined simultaneously.

[Default] n = 0

[See Also] ESC &

[Sample Program]

```
GOSUB *SETCHR
LPRINT CHR$ (&H1B) ; "%" ; CHR$ (0) ;
LPRINT "@A" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "%" ; CHR$ (1) ;
LPRINT "@A" ; CHR$ (&HA) ;
END
  *SETCHR :
LPRINT CHR$ (&H1B) ; "&" ;
LPRINT CHR$ (3) ; "@" ; "A" ;
FOR J=1 TO 2
    READ REP
    LPRINT CHR$ (REP) ;
    FOR I=1 TO REP*3
        READ D
        LPRINT CHR$ (D) ;
    NEXT I
NEXT J
RETURN
DATA  6
DATA  &HFF,  &H80,  &H00
DATA  &H80,  &H80,  &H00
DATA  &H80,  &H80,  &H00
DATA  &H80,  &H80,  &H00
DATA  &HFF,  &HFF,  &HFF
DATA  &HFF,  &HFF,  &HFF
DATA  12
DATA  &HFF,  &HFF,  &HFF
DATA  &H80,  &H07,  &HF9
DATA  &H80,  &HFF,  &HF9
DATA  &H87,  &HFE,  &H01
DATA  &H9F,  &H06,  &H01
DATA  &HF8,  &H06,  &H01
DATA  &HF8,  &H06,  &H01
DATA  &H9F,  &H06,  &H01
DATA  &H87,  &HFE,  &H01
DATA  &H80,  &HFF,  &HF9
DATA  &H80,  &H07,  &HF9
DATA  &HFF,  &HFF,  &HFF
```

[Print Results]

@A ←—— Internal Character Set

ㄱ四 ←—— Download Character

ESC & s n m [a [p] s×a] m–n+1

[Function] Defining the download characters

[Code] <1B> H <26> H <s> <n> <m> [<a> <p1> <p2> … <ps×a>] m-n+1

[Range] s = 3

$32 \le n \le m \le 126$

$0 \le a \le 12$ (Font A)

$0 \le a \le 9$ (Font B)

$0 \le p1 \bullet\bullet ps \times a \le 255$

[Outline] Defines the font of download characters of alphanumeric characters.

- "s" indicates the number of bytes in vertical direction.
- "n" indicates the start character code and "m" the end character code. To define only one character, set n=m.
- Character codes definable includes 95 ASCII codes in total between 32~126.
- "a" indicates the number of dots in horizontal direction for definition.
- "p" is the data to be defined, which indicate a pattern equal to "a" dot in horizontal direction from the left end. The rest of the pattern on the right side is filled with space.
  The rest of data to be defined is s×a.
- Download characters thus defined remain valid until redefinition, ESC @ execution, GS * execution, or power OFF is practiced.

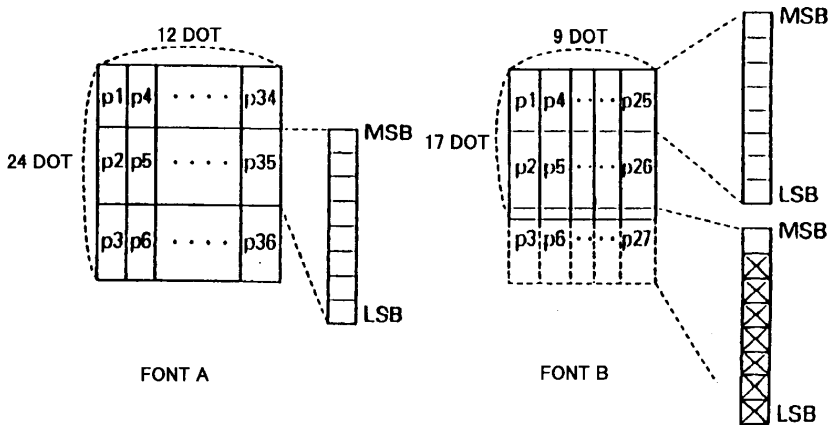
[Caution] Download characters and download bit images cannot be defined simultaneously.

Running this command clears the definition of the download bit image.

[Default] Same as the internal character set

[See Also] ESC %

[Example]



Create each data bit by setting "1" for a printed dot and "0" for an unprinted dot.

[Sample Program] [Print Results]

See Sample Program and Print Results for ESC % on page 52.

ESC * m n1 n2 [d] k

[Function] Specifying the bit image mode

[Code] <1B> H <2A> H <m> <n1> <n2> [<d>] k

[Range] m= 0, 1, 32, 33

$0 \le n1 \le 255$

$0 \le n2 \le 3$

$0 \le d \le 255$

$k = n1 + 256 \times n2$ (m = 0, 1)

$k = (n1 + 256 \times n2) \times 3$ (m = 32, 33)

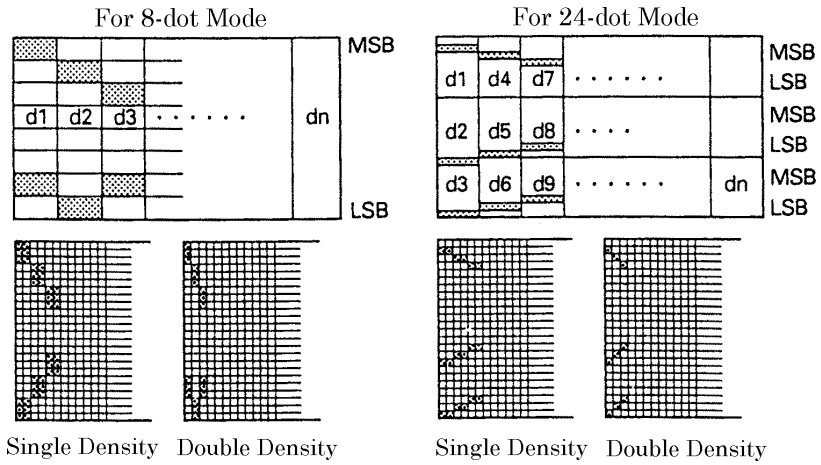
[Outline] According to the number of dots specified in "n1," "n2," specify the bit image of mode "m."

- The number of dots printed is divided by 256, whose quotient is taken as n2 and residual as "n1."
- The total number. of dots printed in the bit image is equal to $n1 + (256 \times n2)$.
- When bit image data have been input in excess of dot position of one line, the excess data are discarded.
- "d" is bit image data, the bits subject to printing are taken as "1" and those not as "0".
- The bit image modes specified by m are shown as follows:

m	Mode	Vertical Direction		Horizontal Direction	
		No. of Dots	Dot Density	Dot Density	Max. No. of Dots
0	8-dot single density	8	60 DPI	90 DPI	n1 + n2×256
1	8-dot double density	8	60 DPI	180 DPI	n1 + n2×256
32	24-dots single density	24	203 DPI	90 DPI	(n1+n2×256)×3
33	24-dots double density	24	203 DPI	180 DPI	(n1+n2×256)×3

[Caution]
- When the values set in m (Bit image mode) are out of the above range, the data following after n1 is processed as normal printing data.
- After completion of bit image printing, printer returns to normal data processing mode.

[Example]

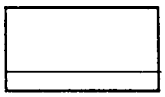


[Sample Program]

```
LPRINT CHR$ (&H1B) ; "*" ;
LPRINT CHR$ (0) ; CHR$ (20) ; CHR$ (0) ;
GOSUB *IMG1
LPRINT CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "*" ;
LPRINT CHR$ (1) ; CHR$ (20) ; CHR$ (0) ;
GOSUB *IMG1
LPRINT CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "*" ;
LPRINT CHR$ (32) ; CHR$ (20) ; CHR$ (0) ;
GOSUB *IMG2
LPRINT CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "*" ;
LPRINT CHR$ (33) ; CHR$ (20) ; CHR$ (0) ;
GOSUB *IMG2
LPRINT CHR$ (&HA) ;
END
```

```
*IMG1:
  LPRINT CHR$ (&HFF) ;
  FOR I=1 TO 18
        LPRINT CHR$ (&H85) ;
  NEXT I
  LPRINT CHR$ (&HFF) ;
  RETURN
*IMG2 :
  FOR I=1 TO 3
         LPRINT CHR$ (&HFF) ;
  NEXT I
  FOR I=1 TO 18
        LPRINT CHR$ (&H80) ;
        LPRINT CHR$ (&H00) ;
        LPRINT CHR$ (&H05) ;
  NEXT I
  FOR I=1 TO 3
         LPRINT CHR$ (&HFF) ;
  NEXT I
  RETURN
```

[Print Results]



← 8-dots single density

← 8-dots double density

← 24-dots single density

← 24-dots double density

ESC – n

[Function] Specifying/Canceling underline

[Code] <1B> H <2D> H <n>

[Range] 0 ≤ n ≤ 2

[Outline] Specifying/canceling an underline.

• Types of underlines by "n" value are shown below:

n	Type
0	Canceling an underline
1	Specifying an underline for 1-dot width
2	Specifying an underline for 2-dots width

[Caution] • An underline is attached to the full character width. It is, however, not attached to the part having been skipped by horizontal tab command.

• An underline is not attached to a 90 °- right-turned characters.

• Specification/cancellation with this command is invalid to Kanji.

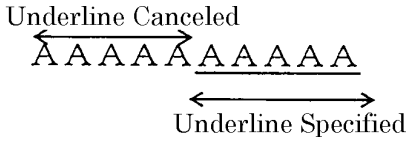
[Default] n = 1

[See Also] ESC !

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "–" ; CHR$ (0) ;
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) ; "–" ; CHR$ (1) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
END
```

[Print Results]



ESC 2

[Function] Specifying 1/6-inch line feed rate

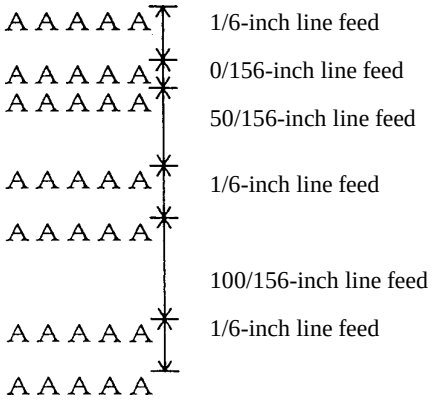
[Code] <1B> H <32> H

[Outline] The line feed rate per line is specified by 1/6 inch.

[Sample Program]

```
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "3" ; CHR$ (0) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "3" ; CHR$ (50) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "2" ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) ; "J" ; CHR$ (100) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
```

[Print Results]



ESC 3 n

[Function] Setting line feed rate of minimum pitch

[Code] <1B> H <33> H <n>

[Range] $0 \leq n \leq 255$

[Outline] Sets the line feed width per line to [n × basic calculation pitch] inches.

[Caution] The line feed width can be set separately for the Standard and Page modes.

The basic calculation pitch is set by GS P. Once defined, the line feed width is not changed if the basic calculation pitch is changed by GS P.

Fractions resulting from calculation are corrected with the minimum pitch of the mechanism, and the remainder is omitted.

- In Standard mode, this command uses the vertical (paper feed direction) basic calculation pitch (y).
- In Page mode, this command acts differently depending on the start point:
  (1) If the start point specified by ESC T is top left or bottom right, the command uses the vertical (paper feed direction) basic calculation pitch (y).
  (2) If the start point specified by ESC T is top right or bottom left, the command uses the horizontal (perpendicular to the paper feed direction) basic calculation pitch (x).

The maximum settable line feed width is 1016 mm (40 inches). A setting greater than this maximum is trimmed to the maximum.

[Default] 4.23 mm

[See Also] ESC 2, ESC c1, GS P

ESC = n

[Function] Data input control

[Code] <1B> H <3D> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Selecting equipment in which data input from the host is effective.

• Each bit of "n" indicates as follows:

Bit	Equipment	Value	
		0	1
0	Printer	Invalid	Valid
1	Not defined		
2	Not defined		
3	Not defined		
4	Not defined		
5	Not defined		
6	Not defined		
7	Not defined		

• When the printer has not been selected, this printer abandons all the received data until it is selected by this command.

[Caution] • Even when the printer has not been selected, it can become BUSY state through printer operation.

• When the printer is deselected, this printer discards all the data until it is selected with this command. (Except DLE ENQ1 and DLE ENQ2)

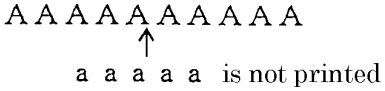
[Default] n = 1

[See Also] DLE ENQ

[Sample Program]

```
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) ; "=" ; CHR$ (0) ;
LPRINT "aaaaa" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "=" ; CHR$ (1) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
```

[Print Results]



ESC ? n

[Function] Deleting downloaded characters

[Code] <1B>H<3F>H<n>

[Outline] Deletes the downloaded characters of specified code.

[Caution]
- The character "n" indicates the character code used to delete the defined pattern. After the deletion, characters are printed in the same pattern as the internal characters.
- This command deletes the code-defined pattern of the character font selected by ESC !.
- This command is ignored if the specified character code is undefined.

[See Also] ESC &, ESC %

ESC @

[Function] Initializing the printer

[Code] <1B> H <40> H

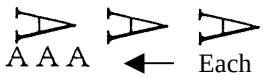
[Outline] Clears data stored in the print buffer and brings various settings to the initial state (default state).

[Caution]
- Data inside the internal input buffer are not cleared.
- DIP switches settings are red once again.

[Sample Program]

```
LPRINT CHR$ (&H1B) ; " ! " ; CHR$ (&H30) ;
LPRINT CHR$ (&H1B) ; "V" ; CHR$ (1) ;
LPRINT "AAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "@" ;
LPRINT "AAA" ; CHR$ (&HA) ;
```

[Print Results]



Each setting has been initialized by this command.

ESC D [n] k NUL

[Function] Setting horizontal tab position

[Code] <1B> H <44> H [<n>] k <00> H

[Range] $1 \leq n \leq 255$

$0 \leq k \leq 32$

[Outline] Specifying a horizontal tab position.

- "n" indicates the number of columns from the beginning to the horizontal tab position. At this time, "n= set position– 1" is to be specified. For example, to set the position at 9th column, n=8 is to be specified.
- "k" denotes the number of horizontal tab positions you want to set.
- The tab position is set at position where it is "character width×n" from the line beginning. The character width, at this time, includes the rightward space amount. In double wide characters, it is made double of the ordinary case.
- Tab positions can be specified are maximum 32. Specifying exceeding this is ignored.
- <n> k, which denotes a setting position, is input in the increasing order and ends at <00> H.
- ESC D NUL clears all the set tab positions. Following clearing, horizontal tab command is ignored.

[Caution] When the data, <n> k, is equal to or smaller than its preceding data, <n> k-1, it is assumed that tab setting is finished. If this is the case, the next data onward will be processed as normal data.

When the data, <n> k, exceeds a 1-line print area, set the horizontal tab position, assuming "Set digit position = Maximum print digits + 1." The horizontal tab position does not change even if the character width is altered after setting the horizontal tab position.

[Default] • Initial value is specified for each eight characters (9th., 17th., 25th. columns) of Font A.

[See Also] HT

[Sample Program] [Print Results]

See Sample Program and Print Results for HT on page 40.

ESC E n

[Function] Specifying/Canceling highlighting

[Code] <1B> H <45> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Specifying/canceling the highlighting characters.

• "n" is valid only for the lowest bit (n0).

• Control by the lowest bit (n0) is shown as follows:

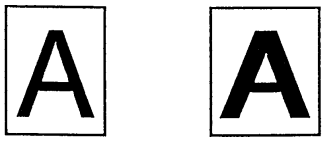
n0	Type
0	Canceling highlighting
1	Specifying highlighting

• This is effective to all characters.

• Dot configuration of a highlighted character includes one extra dot added at its side.

[See Also] ESC !

[Example]



[Sample Program]

```
LPRINT CHR$ (&H1B) ; "E" ; CHR$ (0) ;
LPRINT "AAABBB" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "E" ; CHR$ (1) ;
LPRINT "AAABBB" ; CHR$ (&HA) ;
```

[Print Results]

```
AAABBB  ← Highlighting canceled
AAABBB  ← Highlighting specified
```

ESC G n

[Function] Specifying/Canceling double printing

[Code] <1B> H <47> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Specifying/canceling the double printing.

• "n" is valid only for the lowest bit (n0).

• Control by "n" is shown as follows.

n0	Type
0	Canceling double printing
1	Specifying double printing

This is effective to all characters.

[Caution] The print result of double printing and highlight character printing is completely same.

[See Also] ESC E

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "G" ; CHR$ (0) ;
LPRINT "AAABBB" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "G" ; CHR$ (1) ;
LPRINT "AAABBB" ; CHR$ (&HA) ;
```

[Print Results]

AAABBB ← Double Printing canceled

AAABBB ← Double Printing specified

ESC J n

[Function] Printing and feeding paper in minimum pitch

[Code] <1B> H <4A> H <n>

[Range] $0 \leq n \leq 255$

[Outline] Prints the data held in the print buffer and feeds paper by n/360 inches. The beginning of the line is taken as the start position for the next print.

[Caution] The line feed width can be set separately for the Standard and Page modes.

This command does not affect the line feed width defined by ESC 2 or ESC 3.

The basic calculation pitch is set by GS P.

Fractions resulting from calculation are corrected with the minimum pitch of the mechanism, and the remainder is omitted.

In Standard mode, this command uses the vertical (paper feed direction) basic calculation pitch (y).

In Page mode, this command acts differently depending on the start point:

(1) If the start point specified by ESC T is top left or bottom right, the command uses the vertical (paper feed direction) basic calculation pitch (y).

(2) If the start point specified by ESC T is top right or bottom left, the command uses the horizontal (perpendicular to the paper feed direction) basic calculation pitch (x).

The maximum settable line feed width is 1016 mm (40 inches). A setting greater than this maximum is trimmed to the maximum. The beginning of the line is taken as the start position for the next print.

[Default] Undefined

[Sample Program] [Print Results]

See Sample Program and Print Results for ESC 2 on page 57.

ESC L

[Function] Selecting Page mode

[Code] <1B>H<4C>H<n>

[Outline] Switches from Standard mode to Page mode.

[Caution]
- This command is only effective if it entered at the beginning of a line.
- This command is not effective if it is entered when in Page mode.
- Standard mode is restored when printing specified by FF is finished or when ESC S is issued.
- The character mapping start position will be the point specified by ESC T in the print area specified by ESC W.
- The commands listed below, which have separate settings for Page mode and Standard mode, are changed to the settings for Page mode use.
  (1) Spacing setting: ESC SP
  (2) Line feed width setting: ESC 2, ESC 3
- In Page mode, the following commands can only be set.
  (1) ESC V Specifying/changing to 90°-right-turned characters.
  (2) ESC a Aligning the characters.
  (3) ESC { Specifying/canceling the inverted characters.
  (4) GS L Setting the left margin.
  (5) GW W Setting the print area width.

ESC @ restores Standard mode.

[See Also] "Page Mode" in Appendix 1

FF, CAN, ESC FF, ESC S, ESC T, ESC W, GS S, GS ¥

ESC R n

[Function] Selecting the international character set

[Code] <1B> H <52> H <n>

[Range] 0 ≤ n ≤ 10

[Outline] Depending on the value of "n," following character sets are specified.

n	Character Set
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

[Caution] Spain, Norway, and Denmark II can only be set with this command.

[Default] The default of "n" is the character set for the country specified by the DIP switch.

[See Also] Character Code Table (International Character Set)

[Sample Program]

```
FOR I=0 TO 10
    LPRINT CHR$ (&H1B) ; "R" ; CHR$ (I) ;
    LPRINT " #$@[¥]^" ;
    LPRINT CHR$ (&H60) ; " { ¦ }~ " ;
    LPRINT "n=" ; STR$ (I) ;
    LPRINT CHR$ (&HA) ;
NEXT I
END
```

[Print Results]

```
#$@[\]^`{¦}~ n= 0
#$à°ç§^`éùè¨ n= 1
#$§ÄÖÜ^`äöüß n= 2
£$@[\]^`{¦}~ n= 3
#$@ÆØÅ^`æøå~ n= 4
#¤ÉÄÖÅÜéäöåü n= 5
#$@°\é^ùàòèì n= 6
₧$@¡Ñ¿^`¨ñ}~ n= 7
#$@[¥]^`{¦}~ n= 8
#¤ÉÆØÅÜéæøåü n= 9
#$ÉÆØÅÜéæøåü n= 10
```

ESC S

[Function] Selecting Standard mode

[Code] <1B>H<53>H<n>

[Outline] Switches from Page mode to Standard mode.

[Caution]
- This command is only effective if it is entered when in Page mode.
- Any data mapped in Page mode is erased.
- After this command is executed, the beginning of the line is taken as the start position for the next print command.
- The print area defined by ESC W is initialized.
- The commands listed below, which have separate settings for Standard mode and Page mode, are changed to the settings for Standard mode use.
  (1) Spacing setting: ESC SP
  (2) Line feed width setting: ESC 2, ESC 3
- Standard mode is selected when the printer is turned on or when ESC @ is executed.

[See Also] FF, ESC FF, ESC L

ESC T n

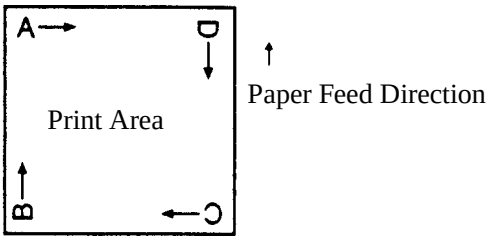
[Function] Selecting the character printing direction in Page mode

[Code] <1B>H<54>H<n>

[Range] 0 ≤ n ≤ 3, 48 ≤ n ≤ 51

[Outline] Selects the direction and start position of character printing in Page mode.

n	Printing direction	Start point
0,48	Left to right	Top left ("A" in the figure)
1,49	Bottom to top	Bottom left ("B" in the figure)
2,50	Right to left	Bottom right ("C" in the figure)
3,51	Top to bottom	Top right ("D" in the figure)



[Caution]
- When Standard mode is selected, this command only executes the internal flagging of the printer without affecting the printing in Standard mode.
- The character mapping position will be the start position in the print area specified by ESC W.
- The basic pitch (x or y) used by the following commands varies with the start point.
  (1) If the start point is the top left or bottom right (the characters are mapped in the direction perpendicular to the paper feed).
    - Commands using x: ESC SP, ESC S, ESC ¥
    - Commands using y: ESC 3, ESC J, GS S, GS ¥
  (2) If the start point is the top right or bottom left (the characters are mapped in the paper feed direction).
    - Commands using x: ESC 3, ESC J, GS S, GS ¥
    - Commands using y: ESC SP, ESC S, ESC ¥

[Default] n = 0

[See Also] "Page Mode" in Appendix 1

ESC $, ESC L, ESC W, ESC ¥, GS $, GS P, GS ¥

ESC V n

[Function] Specifying/Canceling 90°-right-turned characters

[Code] <1B> H <56> H <n>

[Range] 0 ≤ n ≤ 1

[Outline] Specifying/canceling characters 90°-right- turned character.

• "n" means the followings.

n	Condition
0	Canceling 90°-right- turned Characters
1	Specifying 90°-right- turned Characters

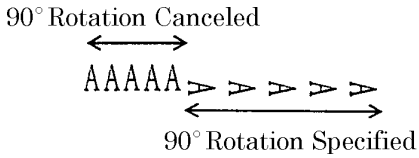
[Caution] No underlines are attached to 90°-right- turned characters .

[Default] n = 0

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "V" ; CHR$ (0) ;
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) ; "V" ; CHR$ (1) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
END
```

[Print Results]



ESC W xL xH yL yH dxL dxH dyL dyH

[Function] Defining the print area in Page mode

[Code] <1B>H<57>H<xH><yH><dxL><dxH><dyL><dyH>

[Range] 0 ≤ xL, xH, yL, yH, dxL, dxH, dyL, dyH ≤ 255, except for dxL = dxH = 0 or dyL = dyH = 0

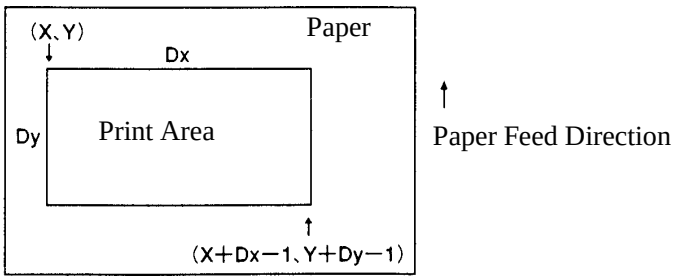
[Outline] Defines the location and size of the print area.

- Horizontal start point = [(xL + xH (256) (basic calculation pitch] inches
- Vertical start point = [(yL + yH (256) (basic calculation pitch] inches
- Horizontal length = [(dxL + dxH (256) (basic calculation pitch] inches
- Vertical length = [(dyL + dyH (256) (basic calculation pitch] inches

[Caution]

- When Standard mode is selected, this command only executes the internal flagging of the printer without affecting the printing in Standard mode.
- If the horizontal start point or vertical start point is out of the printable area, this command is canceled and the next data is handled as normal data.
- If the horizontal length or vertical length is 0, this command is canceled and the next data is handled as normal data.
- The character mapping position will be the start point specified by ESC T in the print area.
- If the "horizontal start point + horizontal length" is greater than the horizontal printable area, the "horizontal printable area - horizontal start point" is taken as the horizontal length.
- If the "vertical start point + vertical length" is greater than the vertical printable area, the "vertical printable area - vertical start point" is taken as the vertical length.
- The print area is defined by the basic calculation pitch GS P. Once defined, the print area is not changed if the basic calculation pitch is changed by GS P.
- Fractions resulting from calculations are corrected with the minimum pitch of the mechanism, and the remainder is omitted.
- The horizontal start point and horizontal length are calculated with the basic calculation pitch (x). The vertical start point and vertical length are calculated with the basic calculation pitch (y).

• The figure below illustrates the print area, where X = horizontal start point, Y = vertical start point, Dx = horizontal length, and Dy = vertical length.



The printable area for this printer is approximately 72.249 mm (512/180 inches) horizontally and 117.263 mm (1662/360 inches) vertically.

[Default] xL = xH = yL = yH = 0

dxL = 0, dxH = 2, dyL = 126, dyH = 6

[See Also] "Page Mode" in Appendix 1

CAN, ESC L, ESC T, GS P

ESC ¥ nL nH

[Function] Specifying the relative position

[Code] <1B> H <5C> H <nL><nH>

[Range] $0 \leq nL \leq 255$

$0 \leq nH \leq 255$

[Outline] This command specifies the start position for the next print in terms of a relative position with respect to the current position. The start position for the next print will be at a distance of [(nL + nH × 256) × basic calculation pitch] inches away the current position.

[Caution]
- Specification of a position outside the print area is ignored.
- The new position to be specified for the character of interest will be positive ("+") if it is to the right of the current position. It will be negative ("-") if it is to the left of the current position.
- A negative value is the complement of 65536. For example, to move the position by N pitches to the left, specify it as:

  nL + nH × 256 = 63356 - N
- The basic calculation pitch is set by GS P.
- Fractions resulting from calculation are corrected with the minimum pitch of the mechanism, and the remainder is omitted.
- In Standard mode, this command uses the horizontal basic calculation pitch (x).
- In Page mode, this command acts differently depending on the start point:
  (1) If the start point specified by ESC T is top left or bottom right, the command specifies the relative position in the direction perpendicular to the paper feed (the character's side-to-side direction), using the horizontal basic calculation pitch (x).
  (2) If the start point is top right or bottom left, the command specifies the relative position in the paper feed direction (the character's side-to-side direction), using the vertical basic calculation pitch (y).

[See Also] ESC $, GS P

[Sample Program] [Print Results]

See Sample Program and Print Results for ESC $ on page 51.

ESC a n

[Function] Aligning the characters

[Code] <1B> H <61> H <n>

[Range] 0 ≤ n ≤ 2, 48 ≤ n ≤ 50

[Outline] All the printed data within one line are aligned in the specified position.

• Depending on "n" value, positional alignment is carried out as in the table below:

n	Position
0,48	Left end alignment
1,49	Centering
2,50	Right end alignment

[Caution] • This is valid only when "n" is inputted at the beginning of line.

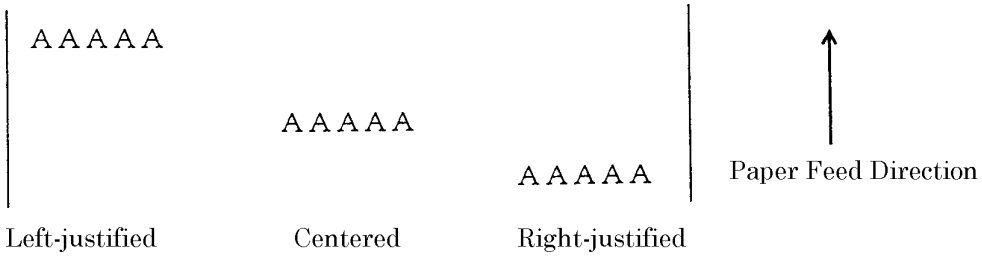
• This command does not affect the Page mode.

[Default] n = 0

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "a" ; CHR$ (0) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "a" ; CHR$ (1) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
LPRINT CHR$ (&H1B) ; "a" ; CHR$ (2) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
END
```

[Print Results]



ESC c 3 n

[Function] Selecting the paper near end sensor valid for a paper end signal output

[Code] <1B>H<63>H<33>H<n>

[Range] 0 ≤ n ≤255

[Outline] This command selects at which paper near end sensor a paper end signal should be output. Each bit for "n" has the following meaning:

Bit	Position	Value	
		0	1
0	Paper near end	Disabled	Enabled
1~7	Undefined		

This printer can only select one kind of paper end detection, a paper-near-end sensor. "n" is valid for the least significant bit (n0).

[Caution] This command is valid only for the parallel interface.

[Default] n = 0

[Sample Program]

```
LPRINT CHR$(&H1B);"c3";CHR$(0);
      •••••••When outputting the paper-end signal at the paper end
LPRINT CHR$(&H1B);"c3";CHR$(1);
      •••••••When outputting the paper-end signal at the paper near end
```

ESC c 4 n

[Function] Selecting the paper near end sensor valid for print stop

[Code] <1B>H<63>H<34>H<n>

[Range] 0 ≤ n ≤ 255

[Outline] This command selects at which paper near end sensor printing should be stopped. Each bit for "n" has the following meaning:

Bit	Position	Value	
		0	1
0	Paper near end	Disabled	Enabled
1~7	Undefined		

This printer can only select one kind of paper-end detection, a paper-near-end sensor. "n" is valid for the least significant bit (n0).

[Default] n = 0

[Sample Program]

```
LPRINT CHR$(&H1B);"c4";CHR$(0);
      •••••••When stopping printing at the paper end
LPRINT CHR$(&H1B);"c4";CHR$(1);
      •••••••When stopping printing at the paper near end
```

ESC c 5 n

[Function] Enabling/Disabling the panel switches

[Code] <1B> H <63> H <35> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Selecting the FEED switch valid/invalid.

• "n" is valid only in the lowest bit (n0).

• "n" bit means the followings.

n0	Condition
0	FEED switch valid.
1	FEED switch invalid.

[Caution] When the panel switch is disabled with this command, the FEED switch is disabled. Therefore, the paper cannot be fed by operating the FEED switch.

[Default] n = 0

[Sample Program]

```
LPRINT CHR$ (&H1B) ; "c5" ; CHR$ (0) ; ••••••• When enabling the FEED switch
LPRINT CHR$ (&H1B) ; "c5" ; CHR$ (1) ; ••••••• When disabling the FEED switch
```

ESC d n

[Function] Printing and feeding the paper by n lines

[Code] <1B> H <64> H <n>

[Range] 0 ≤ n ≤ 255

[Outline] Prints data in the buffer and feeds paper by "n" lines.

• Specified line does not remain.

• The beginning of the line is to be considered as the next printing start position.

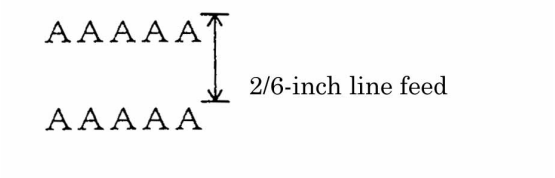
[Caution] If [n × line feed width] exceeds approximately 1016 mm, this command feeds paper by approximately 1016 mm (40 inches).

[Default] The initial value is not defined.

[Sample Program]

```
LPRINT "AAAAA"
LPRINT CHR$ (&H1B) ; "d" ; CHR$ (2) ;
LPRINT "AAAAA" ; CHR$ (&HA) ;
END
```

[Print Results]



ESC i

[Function] Full cut

[Code] <1B>H<69>H

[Outline] Activating auto cutter unit (Full cut)

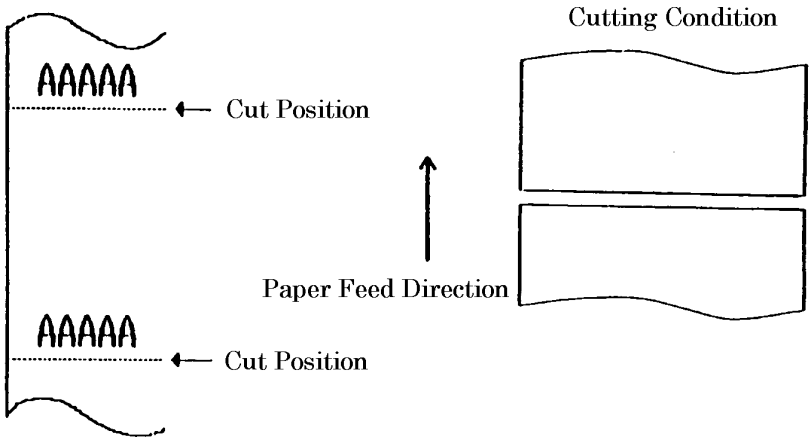
[Caution] • This command is valid only when it is inputted at the beginning of line.

• Prior to cutting the paper, feed the paper from the printing position to beyond the paper cutting position of the cutter. Otherwise, the character just after print will remain on this side of the cutter.

[Sample Program]

```
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) + "J" ;
LPRINT CHR$ (150) ;
LPRINT CHR$ (&H1B) + "i" ;
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) + "J" ;
LPRINT CHR$ (150) ;
LPRINT CHR$ (&H1B) + "i" ;
```

[Print Results]



ESC m

[Function] Partial cut

[Code] <1B>H<6D>H

[Outline] Activating auto cutter unit (Partial cut)

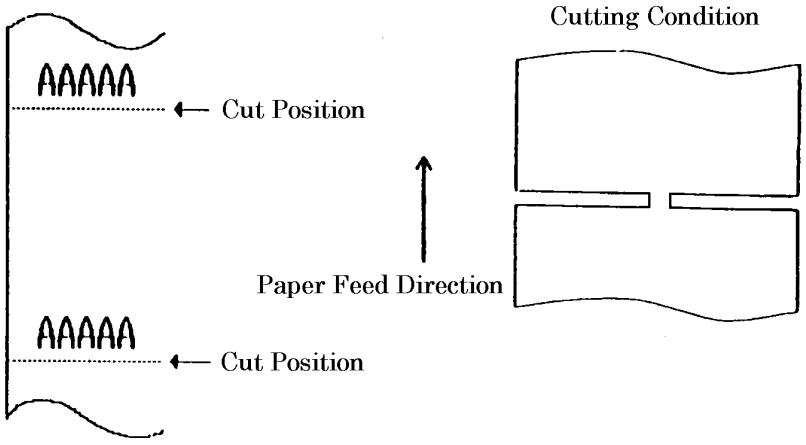
[Caution] • This command is valid only when it is inputted at the beginning of line.

• Prior to cutting the paper, feed the paper from the printing position to beyond the paper cutting position of the cutter. Otherwise, the character just after print will remain on this side of the cutter.

[Sample Program]

```
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) + "J" ;
LPRINT CHR$ (150) ;
LPRINT CHR$ (&H1B) + "m" ;
LPRINT "AAAAA" ;
LPRINT CHR$ (&H1B) + "J" ;
LPRINT CHR$ (150) ;
LPRINT CHR$ (&H1B) + "m" ;
```

[Print Results]



ESC p m n1 n2

[Function] Generating the specified pulses

[Code] <1B>H<70>H<m><n1><n2>

[Range] m = 0, 1

$0 < n1 \leq n2 \leq 255$

[Outline] The signals specified by "n1" and "n2" are output to the connector pin specified by "m".

• "m" has the followings.

m	Connector Pin
0	Drawer kick pin No.2
1	Drawer kick pin No.5

• The ON time is n1×2 ms, and OFF time n2×2 ms.

[Caution] • When "m" is beyond a definition range, no signal is output, discarding "n1" and "n2."

• A drawer drive duty is as follows.

$$\frac{\text{ON time}}{\text{ON time + OFF time}} \leq 0.2$$

(The OFF time should be 4 times or more larger than the ON time.)

[Default] The initial value for "m", "n1" and "n2" is not defined.

[Sample Program]

```
LPRINT CHR$ (&H1B) + "p"
LPRINT CHR$ (0) ; ••••••• Selects pin No. 2.
LPRINT CHR$ (5) ; ••••••• Sets ON time to 10ms
LPRINT CHR$ (50) ; ••••••• Sets OFF time to 100ms
END
```

ESC t n

[Function] Selecting the character code table

[Code] <1B>H<74>H<n>

[Range] 0 ≤ n ≤ 5, n = 255

[Outline] Selecting page "n" on the character code table:

The character code table is selected depending on the value of "n."

"n" means the followings.

n	Page on the Character Code Table
0	Page 0
1	Page 1
2	Page 2
3	Page 3
4	Page 4
5	Page 5
255	Page 255 (blank page)

[Default] n = 0

[See Also] Character Code Table

[Sample Program]

```
LPRINT CHR$ (&H1B) + "t" + CHR$ (0) ;
LPRINT " n=0              " ;
FOR C=&HB1 TO &HB5
LPRINT CHR$ (C) ;
NEXT C
LPRINT CHR$ (&HA) ;
LPRINT CHR$ (&H1B) + "t" + CHR$ (1) ;
LPRINT " n=1              " ;
FOR C=&HB1 TO &HB5
LPRINT CHR$ (C) ;
NEXT C
LPRINT CHR$ (&HA) ;
```

[Print Results]

ESC { n

[Function] Specifying/Canceling the inverted characters

[Code] <1B>H<7B>H<n>

[Range] 0 ≤ n ≤ 255

[Outline] Specifying/canceling inverted characters.

• "n" is valid only for the lowest bit (n0).

• Bit "n" (n0) means the followings.

n0	Condition
0	Canceling inverted characters.
1	Specifying inverted characters.

[Caution] • Inverted printing means printing the line at 180°turned.

• This command is valid only when it is specified at the beginning of a line.

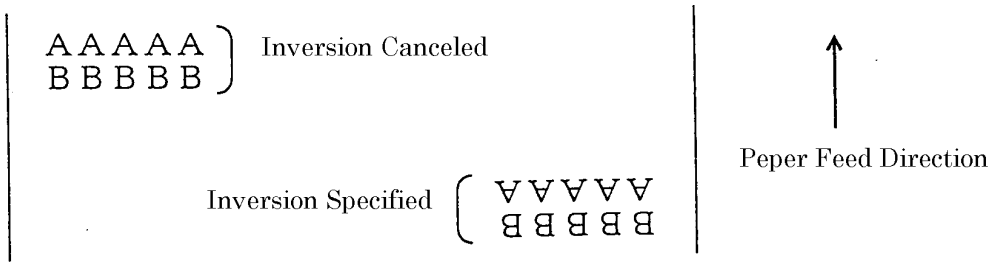
• This command does not affect the Page mode.

[Default] n = 0

[Sample Program]

```
LPRINT CHR$ (&H1B) + "{" + CHR$ (0) ;
LPRINT "AAAAA" + CHR$ (&HA) ;
LPRINT "BBBBB" + CHR$ (&HA) ;
LPRINT CHR$ (&H1B) + "{" + CHR$ (1) ;
LPRINT "AAAAA" + CHR$ (&HA) ;
LPRINT "BBBBB" + CHR$ (&HA) ;
```

[Print Results]



GS ! n

[Function] Specifying the character size

[Code] <1D>H<21>H<n>

[Range] 0 ≤ n ≤ 255, where:

1 ≤ vertical magnification ≤ 8, and 1 ≤ horizontal magnification ≤ 8

[Outline] Specifies the character size (vertical and horizontal magnification).

Bit	Meaning	Value	
		Hex. Number	Decimal Number
0	Vertical magnification specification	See Table 2, "Vertical Magnification"	
1			
2			
3			
4	Horizontal magnification specification	See Table 1, "Horizontal Magnification"	
5			
6			
7			

Table 1 Horizontal Magnification

Hex.	Decimal	Magnification
00	0	1×(standard)
10	16	2×(horizontal double)
20	32	3×
30	48	4×
40	64	5×
50	80	6×
60	96	7×
70	112	8×

Table 2 Vertical Magnification

Hex.	Decimal	Magnification
00	0	1×(standard)
01	1	2×(vertical double)
02	2	3×
03	3	4×
04	4	5×
05	5	6×
06	6	7×
07	7	8×

[Caution]

- This command works for all alphanumeric characters except for HRI characters.
- This command is ignored if either the vertical magnification or horizontal magnification is out of range.
- In Standard mode, the vertical direction is defined as the paper feed direction, and the horizontal direction is defined as the direction perpendicular to the paper feed. These definitions are, therefore, interchanged when 90°-right-turned characters are specified.
- In Page mode, the vertical direction means the top-bottom direction of each character. The horizontal direction means the side-to-side direction of each character.

- If characters of different vertical magnification are contained in a line, the baseline of each character is lined up.
- Horizontal and vertical magnification can also be specified/canceled by ESC !. The ESC ! or GS ! command, whichever is handled last, becomes effective.

[Default] n = 0

[See Also] ESC !

GS $ nL nH

[Function] Specifying the absolute vertical position of characters in Page mode

[Code] <1D>H<24>H<nL><nH>

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

[Outline] This command is used in Page mode to specify the vertical position of characters at the data mapping start position as an absolute value measured from the start point. The vertical position of a character at the next data mapping start position will be at a distance of [(nL + nH (256) (basic calculation pitch] inches away from the start point.

[Caution]
- This command is ignored when Page mode is not selected.
- Any specification of absolute vertical position out of the printable area is ignored.
- The horizontal position of a character at the data mapping start position is not moved.
- The start point used as the reference is specified by ESC T.
- Depending on the start point specified by ESC T, this command acts as follows:
  (1) If the start point is the top left or bottom right, the command specifies the absolute position in the paper feed direction (the character's top-bottom direction), using the vertical basic calculation pitch (y).
  (2) If the start point is the top right or bottom left, the command specifies the absolute position in the direction perpendicular to the paper feed (the character's top-bottom direction) using the horizontal basic calculation pitch (x).
- The basic calculation pitch is set by GS P.
- Fractions resulting from calculations are corrected with the minimum pitch of the mechanism, and the remainder is omitted.

[See Also] ESC $, ESC T, ESC W, ESC ¥, GS P, GS ¥

GS * n1 n2 [d] n1 × n2 × 8

[Function] Defining the download bit image

[Code] <1D>H<2A>H<n1><n2> [< d >] n1 × n2 × 8

[Range] 1 ≤ n1 ≤ 255

1 ≤ n2 ≤ 48

n1 × n2 ≤ 1536

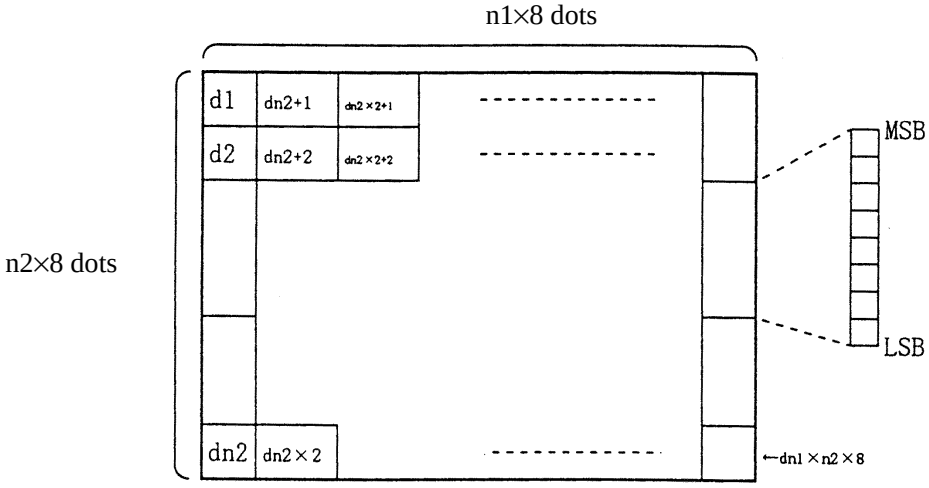
[Outline] Defines download bit images of the number of dots specified by n1/n2.

- The numbers of dots are n1×8 in horizontal direction and n2×8 in vertical direction.
- "d" indicates bit image data.
- The download bit image thus defined remains effective until redefinition, ESC @ execution, ESC &, or power OFF takes place.

[Caution]

- A download character and a download bit image cannot be defined simultaneously. With this command executed, defined content of a downloaded character is cleared.
- Relations between the bit image data and the dot defined are shown below:

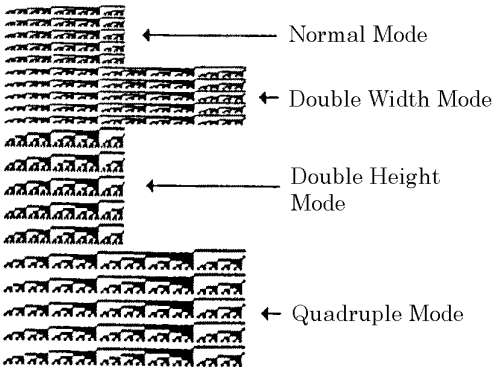
[See Also] GS /



[Sample Program]

```
        GOSUB IMG
        LPRINT CHR$ (&H1D) + "/" + CHR$ (0) ;
        LPRINT CHR$ (&H1D) + "/" + CHR$ (1) ;
        LPRINT CHR$ (&H1D) + "/" + CHR$ (2) ;
        LPRINT CHR$ (&H1D) + "/" + CHR$ (3) ;
        END
IMG :
        n 1 = 10 : n 2= 5
        LPRINT CHR$ (&H1D) + "*" ;
        LPRINT CHR$ (n1) + CHR$ (n2) ;
        FOR J=1 TO n1*8
            FOR I=1 TO n2
                LPRINT CHR$ (J) ;
            NEXT I
        NEXT J
        RETURN
```

[Print Results]



GS / m

[Function] Printing the downloaded bit image

[Code] <1D>H<2F>H<m>

[Range] 0 ≤ m ≤ 3

48 ≤ m ≤ 51

[Outline] Prints downloaded bit image in a mode specified by "m."

Modes can be selected by "m" are shown below.

m	Mode Name	Dot Density in Vertical Direction	Dot Density in Horizontal Direction
0,48	Normal mode	180 DPI	180 DPI
1,49	Double wide mode	180 DPI	90 DPI
2,50	Double high mode	90 DPI	180 DPI
3,51	Double wide/double high mode	90 DPI	90 DPI

[Caution]
- When data exist in the print buffer, this command is ignored.
- When a downloaded bit image has not been defined, this command is ignored.
- A portion of a downloaded bit image exceeding one line length is not printed.
- A downloaded character and a downloaded bit image cannot be defined simultaneously.

[Default] The initial value is not specified.

[See Also] GS *

[Sample Program] [Print Results]

See Sample Program and Print Results for GS * on page 84.

GS :

[Function] Starting/Ending macro definition

[Code] <1D>H<3A>H

[Outline] Specifying starting/ending macro definition.

Means termination when received while defining a macro.

[Caution] Maximum content available for macro definition is 2048 bytes. A portion exceeding 2048 bytes is not defined.

- Even with ESC @ (initialization of the printer) having been executed, defined content is not cleared. Therefore, it is possible to include ESC @ into the content of macro definition.
- Normal printing operation is carried out even while in macro definition.

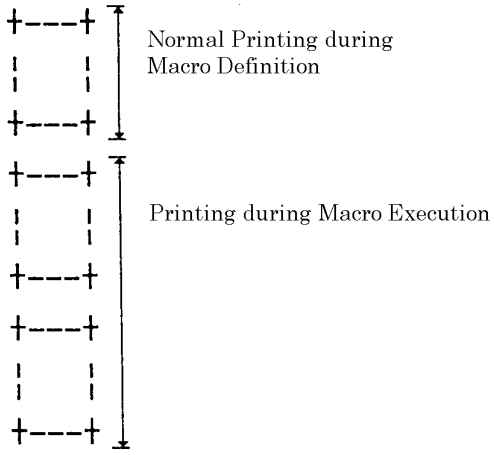
[Default] Initially, macro is not specified.

[See Also] GS ^

[Sample Program]

```
LPRINT CHR$ (&H1D) + " : " ;
LPRINT "+ – – – +" + CHR$ (&HA) ;
LPRINT "|             |" + CHR$ (&HA) ;
LPRINT "+ – – – +" + CHR$ (&HA) ;
LPRINT CHR$ (&H1D) + " : " ;
LPRINT CHR$ (&H1D) + " ^ " ;
LPRINT CHR$ (2) + CHR$ (10) ;
LPRINT CHR$ (0) ;
END
```

[Print Results]



GS B n

[Function] Specifying/Canceling the black/white inverted printing

[Code] <1D>H<42>H<n>

[Range] 0 ≤ n ≤ 255

[Outline] This command specifies or cancels the black/white inverted printing.

- If n = <*******0>B, the black/white inverted printing is canceled.
- If n = <*******1>B, the black/white inverted printing is specified.

[Caution]

- Number "n" is only valid in the lowest bit.
- The black/white inversion works on internal and downloaded characters.
- The black/white inversion works also on the right spacing of characters defined by ESP SP.
- This command does not affect the bit image, downloaded bit image, bar code, HRI characters, or the skip area specified by HT, ESC $, or ESC ¥.
- This command does not affect the space between lines.
- Black/white inversion specification take precedence over underline specification. Underline printing due to underline specification is, therefore, nullified if black/white inversion is specified; the underline setting, however, remains unchanged.

[Default] n = 0

GS H n

[Function] Selecting of printing position of HRI characters

[Code] <1D>H<48>H<n>

[Range] 0 ≤ n ≤ 3

48 ≤ n ≤ 51

[Outline] Selecting printing position of HRI characters in printing bar codes.

• "n" means the followings.

n	Printing Position
0,48	No printing
1,49	Above the bar code
2,50	Below the bar code
3,51	Both above and below the bar code

[Caution] • The HRI characters refer to the bar code-turned characters so that you can read them.

• The HRI characters are printed in the font selected with GS f.

• Specify before the GS k command.

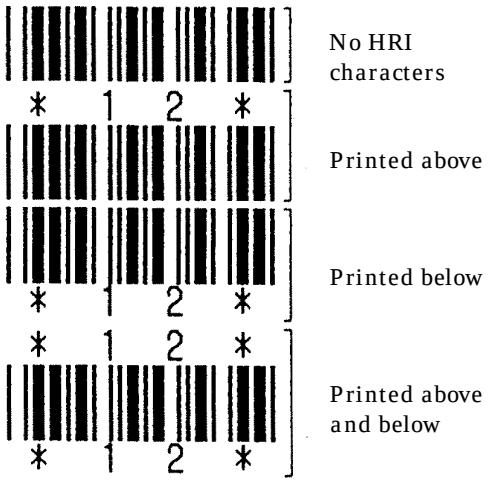
[Default] n = 0

[See Also] GS f, GS k

[Sample Program]

```
LPRINT CHR$ (&H1B) + "3" + CHR$ (5) ;
LPRINT CHR$ (&H1D) + "h" + CHR$ (50) ;
LPRINT CHR$ (&H1D) + "H" + CHR$ (0) ;
GOSUB BC
LPRINT CHR$ (&H1D) + "H" + CHR$ (1) ;
GOSUB BC
LPRINT CHR$ (&H1D) + "H" + CHR$ (2) ;
GOSUB BC
LPRINT CHR$ (&H1D) + "H" + CHR$ (3) ;
GOSUB BC
END
BC :
LPRINT CHR$ (&H1D) + "k" ;
LPRINT CHR$ (4) ;
LPRINT "12" + CHR$ (0) ;
LPRINT CHR$ (&HA) ;
RETURN
```

[Print Results]



GS I n

[Function] Sending the printer ID

[Code] <1D>H<49>H<n>

[Range] 0 ≤ n ≤ 3

49 ≤ n ≤ 51

[Outline] Sends the specified printer ID.

"n" means the following.

n	Type of printer ID	Specification	Value (hex)
1,49	Model ID	iDP3221	20
2,50	Type ID	See table below "Type ID"	
3,51	ROM version ID	As per ROM version	

Type ID

Bit	Meaning	Hex.	Decimal
0	Equipped for 2-byte code support	01	1
1	Equipped with autocutter	02	2
2	Undefined	—	—
3	Undefined	—	—
4	Unused	00	0
5	Undefined	—	—
6	Undefined	—	—
7	Unused	00	0

[Caution]

- Under DTR/DSR control, the printer sends the printer ID after verifying that the host is ready to receive. If the host is not ready to receive, the printer waits for the host to become ready to receive.
- Under XON/OFF control, the printer sends the printer ID without checking whether the host is ready to receive or busy.
- Because this command is executed when data is mapped in the receive buffer, there may be a delay between command receiving and printer ID sending depending on the condition of the receive buffer.
- If ASB (automatic status back) is enabled by GS a, the host must discriminate between the printer ID due to this command and the status due to ASB.

GS L nL nH

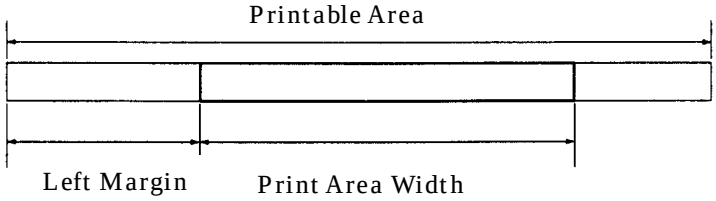
[Function] Setting the left margin

[Code] <1D>H<4C>H<nL><nH>

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

[Outline] This command sets the left margin specified by nL and nH. The value of the left margin is [(nL + nH (256) (basic calculation pitch] inches.



[Caution]
- This command only works when it is entered at the beginning of a line.
- When Page mode is selected, this command only executes the internal flagging of the printer.
- The setting of this command does not affect Page mode.
- The maximum settable left margin is equal to the horizontal printable area. A setting greater than this maximum is trimmed to the maximum.
- The basic calculation pitch is defined by GS P. Once defined, the left margin is not changed if the basic calculation pitch is changed by GS P.
- The left margin is calculated with the horizontal basic calculation pitch (x). A fraction resulting from the calculation is corrected with the minimum pitch of the mechanism, and the remainder is omitted.
- When mapping character data, if the current print area is not wide enough to accommodate one character of the current font, only the line for that character data is handled as follows:
  (1) The print area is extended toward the right to be equivalent to one character of the current font, but not wider than the printable area.
  (2) If one character of the area cannot be provided as a result of step (1), the print area is extended toward the left (so that the left margin is decreased).
- When mapping non-character data (bit image, downloaded bit image, or bar code), if the current print area is narrower than 9 bits, only the line for that data is handled as follows:
  (1) The print area is extended toward the left (so that the left margin is decreased) until it is 9-dot wide, but not wider than the printable area.

[Default] nL = 0, nH = 0

[See Also] GS P, GS W

GS P x y

[Function] Specifying the basic calculation pitch

[Code] <1D>H<50>H<x><y>

[Range] $0 \leq x \leq 255$

$0 \leq y \leq 255$

[Outline] This command sets the horizontal basic calculation pitch to approx. 25.4/x mm (1/x inches), and the vertical basic calculation pitch to approx. 25.4/y mm (1/y inches).

- If x = 0, the horizontal basic calculation pitch is reverted to the default value.
- If y = 0, the vertical basic calculation pitch is reverted to the default value.

[Caution]

- The horizontal direction is defined as the direction perpendicular to the paper feed, and the vertical direction is defined as the paper feed direction.
- In Standard mode, the following parameters are used regardless of the character orientation (e.g. inverted or turned 90°-right-turned).
  (1) Commands using x: ESC SP, ESC S, ESC ¥, GS L, GS W
  (2) Commands using y: ESC 3, ESC J
- In Page mode, the parameters used depend on the character orientation; as follows:
  (1) If the start point specified by ESC T is the top left or bottom right (the characters are mapped in the direction perpendicular to the paper feed).
  •Commands using x: ESC SP, ESC $, ESC W, ESC ¥
  •Commands using y: ESC 3, ESC J, ESC W, GC S,GS ¥
  (2) If the start point specified by ESC T is the top right or bottom left (the characters are mapped in the paper feed direction).
  •Commands using x: ESC 3, ESC J, ESC W, GC S,GS ¥
  •Commands using y: ESC SP, ESC $, ESC W, ESC ¥
- This command does not affect any other values that are already set.
- If calculations made for a combination with another command generate fractions, the fractions are corrected with the minimum pitch of the mechanism, and the remainder is omitted.

[Default] x = 180, y = 360

[See Also] "Page Mode" in Appendix 1

ESC SP, ESC $, ESC 3, ESC J, ESC W, ESC ¥, GS $, GS L, GS W, GS ¥

GS V m ..... (1)
GS V m n ... (2)

[Function] Cutting the paper

[Code] (1) <1D>H<56>H<m>

(2) <1D>H<56>H<m><n>

[Range] (1) 0 ≤ m ≤ 1, 48 ≤ m ≤ 49

(2) 65 ≤ m ≤ 66, 0 ≤ n ≤ 255

[Outline] Cuts the specified paper.

"m" means the following.

m	Meaning
0,48	Full cut
1,49	Partial cut (leaving a bridge area uncut)
65	Paper feed by "cut position + {n×basic calculation pitch}×and full cut
66	Paper feed by "cut position + {n×basic calculation pitch}×and partial cut (leaving a bridge area uncut)

[Caution] • In Standard mode, this command only works when it is entered at the beginning of a line.

For (1):

• A partial cut (leaving a bridge area uncut) is executed.

For (2):

• If n = 0, the paper is fed to the cut position, and then cut. If n≠0, the paper is fed by "n×basic calculation pitch" inches past the cut position, and then cut.

• The basic calculation pitch is set by GS P.

The paper feed amount is calculated with the vertical basic calculation pitch (y). A fractionresulting from the calculation is corrected with the minimum pitch of the mechanism, and the remainder is omitted.

GS W nL nH

[Function] Setting the print area width

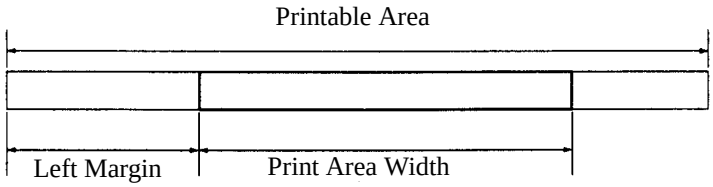
[Code] <1D>H<57>H<nL><nH>

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

[Outline] Sets the print area width specified by nL and nH.

• The print area width will be [(nL + nH×256)×basic calculation pitch] inches.



[Caution]

• This command only works when it is entered at the beginning of a line.

• When Page mode is selected, this command only executes the internal flagging of the printer.

• The setting of this command does not affect Page mode.

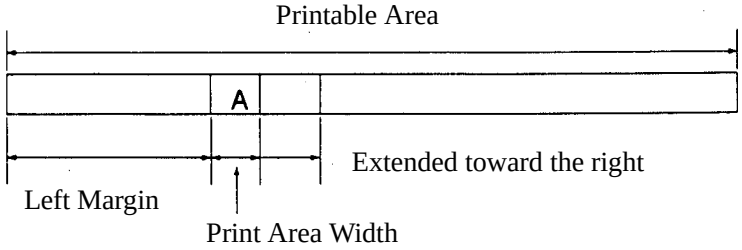
• If the value entered with this command exceeds the printable area for one line, the entire area except the left margin is set as the print area width.

• The basic calculation pitches are defined by GS P. Once defined, the print area width is not changed if the basic calculation pitch is changed by GS P.

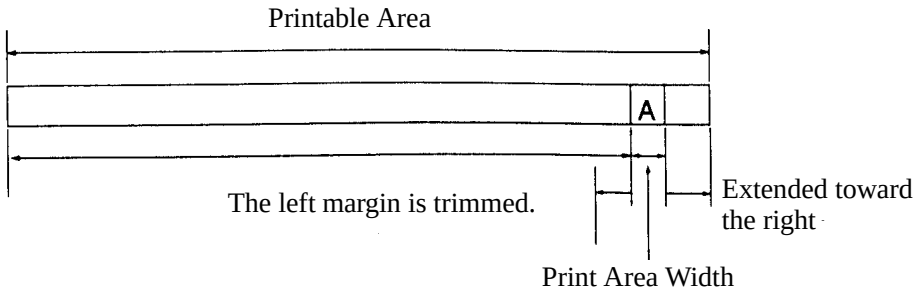
• The print area width is calculated with the horizontal basic calculation pitch (x) defined by GS P. A fraction resulting from the calculation is corrected with the minimum pitch of the mechanism, and the remainder is omitted.

• If the first character to be mapped at the beginning of a line has a width (including the right spacing) greater than the print area width, only that line is handled as follows:

(1) The print area is extended toward the right to accommodate the first character, but not wider than the printable area.



(2) If a sufficient area cannot be provided as a result of step (1), the print area is extended toward the left (so that the left margin is decreased).



(3) If a sufficient area cannot be provided as a result of step (2), the right spacing is trimmed.

• When mapping a bit image (or downloaded bit image), if the print area is narrower than the minimum width of the bit image (two dots for single density, or one dot for double density), only the line for that image is handled as follows:

(1) The print area is extended toward the left (so that the left margin is decreased) until it is equal to the minimum width of the image, but not wider than the printable area.

[Default] nL = 0, nH = 2

[See Also] GS L, GS P

GS ¥ nL nH

[Function] Specifying the relative vertical position of a character in Page mode

[Code] <1D>H<5C>H<nL><nH>

[Range] 0 ≤ nL ≤ 255

0 ≤ nH ≤ 255

[Outline] This command is used in Page mode to specify the vertical position of a character at the data mapping start position, in terms of a relative position with respect to the current position. The next data mapping start position will be at a distance of [(nL + nH × 256)×basic calculation pitch] inches away from the current position.

[Caution]
- This command is ignored when Page mode is not selected.
- The new position to be specified for the character of interest will be positive ("+") if it is under the current position. It will be negative ("-") if it is above the current position.
- A negative value is the complement of 65536. For example, to move the position by N pitches up, specify it as:

  nL + nH×256 = 65536 - N
- The specification of a relative position outside the specified print area is ignored.
- Depending on the start point specified by ESC T, this command acts as follows:
  (1) If the start point is the top left or bottom right, the command specifies the relative position in the paper feed direction (the character's top-bottom direction) using the vertical basic calculation pitch (y).
  (2) If the start point is the top right or bottom left, the command specifies the relative position in the direction perpendicular to the paper feed (the character's top-bottom direction) using the horizontal basic calculation pitch (x).
- The basic calculation pitch is set by GS P.
- Fractions resulting from calculations are corrected with the minimum pitch of the mechanism, and the remainder is omitted.

GS ^ n1 n2 n3

[Function] Executing the macro

[Code] <1D> H <5E> H <n1> <n2> <n3>

[Range] 0 ≤ n1 ≤ 255

0 ≤ n2 ≤ 255

0 ≤ n3 ≤ 1

[Outline] Executing contents defined in macro.

• "n1~n3" indicate as follows:

n1 : The number of times of macro execution

n2 : Waiting time on macro execution

Waiting time of n2×100 msec is given for every execution.

n3 : Macro execution mode

n3	Mode
0	Continuous execution
1	Execution by FEED Switch

Continuous execution: The Macro is executed "n1" times continuously at the time intervals specified by "n2."

Execution by FEED Switch:

After waiting for lapse of time specified by "n2", the ERROR LED flickers and the FEED switch is waited to be pressed. When it is pressed, the macro is executed once.
This action is repeated "n1" times.

[Caution] • When this command is received while in macro definition, suspension of macro definition is indicated. At this time, the defined content is cleared.

• No execution takes place when macro is held undefined or n1=0.

• While in macro execution with n3=1, paper feed with the FEED switch is not available.

[Default] Initially, this command is not specified.

[See Also] GS :

[Sample Program] [Print Results]

See Sample Program and Print Results for GS : on page 87.

GS a n

[Function] Enabling/Disabling ASB (Automatic Status Back)

[Code] <1D>H<61>H<n>

[Range] 0 ≤ n ≤ 255

[Outline] This command selects the status item to be addressed by ASB (automatic status back).

Bit	Status item addressed by ASB	Hex.	Decimal
0	Status of pin 3 of drawer kick connector = disabled	00	0
	Status of pin 3 of drawer kick connector = enabled	01	1
1	Online/offline status = disabled	00	0
	Online/offline status = enabled	02	2
2	Error status = disabled	00	0
	Error status = enabled	04	4
3	Paper detector = disabled	00	0
	Paper detector = enabled	08	8
4	Undefined	—	—
5	Undefined	—	—
6	Undefined	—	—
7	Undefined	—	—

[Caution]

- If any status item is enabled, the status is sent to the host when this command is executed. After that time on, the status is sent each time an enabled status item changes. Because each status item represents the current condition, status items disabled for ASB may also have changed.
- The ASB function is disabled if all status items are disabled.
- If the ASB function is enabled by default, the host receives the status the first time the printer gets ready for communication after it is turned on.
- The printer sends 4 bytes of status shown in the tables below, without checking whether the host is ready to receive or busy. The 4 bytes of status is a continuous string except for XOFF code.
- Because this command is executed when data is mapped in the receive buffer, there may be a delay between command receiving and status sending depending on the condition of the receive buffer.
- Even if the printer is excluded from the selection of peripheral equipment specified by the data input control command (ESC =), the 4 bytes of status is sent to the host whenever status changes.
- When DLE EOT, GS I, or GS r is used, the host must discriminate between the status due to that command and the status due to ASB.

(1) 1st byte (printer information)

Bit	Status	Hex.	Decimal
0	Unused	00	0
1	Unused	00	0
2	Status of pin 3 of drawer kick connector = "L"	00	0
	Status of pin 3 of drawer kick connector = "H"	04	4
3	Online status	00	0
	Offline status	08	8
4	Unused	01	6
5	Cover closed	00	0
	Cover open	20	32
6	Not in paper feed state triggered by FEED switch	00	0
	In paper feed state triggered by FEED switch	40	64
7	Unused	00	0

(2) 2nd byte (error occurrence information)

Bit	Status	Hex.	Decimal
0	Undefined	—	—
1	Undefined	—	—
2	Undefined	—	—
3	Auto cutter error not occurred	00	0
	Auto cutter error occurred	08	8
4	Unused	00	0
5	Unrecoverable error not occurred	00	0
	Unrecoverable error occurred	20	32
6	Auto recovery error not occurred	00	0
	Auto recovery error occurred	40	64
7	Unused	00	0

(3) 3rd byte (paper detector information)

Bit	Status	Hex.	Decimal
0,1	Paper found by paper near end detector	00	0
	Paper not found by paper near end detector	03	3
2,3	Paper found by paper end detector	00	0
	Paper not found by paper end detector	0C	12
4	Unused	00	0
5	Undefined	—	—
6	Undefined	—	—
7	Unused	00	0

(4) 4th byte (paper detector information)

Bit	Status	Hex.	Decimal
0	Undefined	—	—
1	Undefined	—	—
2	Undefined	—	—
3	Undefined	—	—
4	Unused	00	0
5	Undefined	—	—
6	Undefined	—	—
7	Unused	00	0

[See Also] DLE EOT, GS r, "Identification of Send Status" in Appendix 3

GS f n

[Function] Selecting the font of HRI charactetrs

[Code] <1D> H <66> H <n>

[Range] n = 0, 1

n = 48, 49

[Outline] Selecting the font of HRI characters in printing bar code.

The type of font can be printed by selecting "n" is as follows.

n	Font
0, 48	Font A (12×24)
1, 49	Font B (9×24)

The HRI characters refer to the bar code-turned characters so that you can read them.

[Caution] The HRI characters are printed at the position specified with GS h.

[Default] n = 0

[See Also] GS H

[Sample Program]

```
LPRINT CHR$ (&H1D) ; "h" ; CHR$ (50) ;
LPRINT CHR$ (&H1D) ; "H" ; CHR$ (2) ;
LPRINT CHR$ (&H1D) ; "f" ; CHR$ (0) ;
GOSUB *BC
LPRINT CHR$ (&H1D) ; "f" ; CHR$ (1) ;
GOSUB *BC
END
*BC :
LPRINT CHR$ (&H1D) ; "k" ;
LPRINT CHR$ (4) ;
LPRINT "123" ; CHR$ (0) ;
LPRINT CHR$ (&HA) ;
RETURN
```

[Print Results]

GS h n

[Function] Specifying the height of the bar code

[Code] <1D> H <68> H <n>

[Range] 1 ≤ n ≤ 255

[Outline] Selecting bar code height.

"n" denotes the number of dots in the vertical direction.

[Default] n = 162

[Sample Program] [Print Results]

See Sample Program and Print Results for GS w on page 111.

GS k m [d1 ..... dk] NUL
GS k m n [d1 ..... dn]

[Function] Printing the bar code

[Code] (1) <1D> H <6B> H <m> [d1.....dk] NUL

(2) <1D> H <6B> H <m><n> [d1....dn]

[Range] (1) 0 ≤ m ≤ 6 The definitions of "k" and "d" depend on the bar code system.

(2) 65 ≤ m ≤ 73 The definitions of "n" and "d" depend on the bar code system.

[Outline] Selects a bar code system and prints the bar code.

For (1):

m	Bar code system	Range of "k"	Range of "d"
0	UPC-A	11≤k≤12	48≤d≤57
1	UPC-E	11≤k≤12	48≤d≤57
2	JAN13 (EAN)	12≤k≤13	48≤d≤57
3	JAN8 (EAN)	7≤k≤8	48≤d≤57
4	CODE39	1≤k	48≤d≤57, 65≤d≤90 32, 36, 37, 43, 45, 46, 47
5	ITF	1≤k (must be an even number)	48≤d≤57
6	CODEBAR	1≤k	48≤d≤57, 65≤d≤68 36, 43, 45, 46, 47, 58

For (2):

m	Bar code system	Range of "n"	Range of "d"
65	UPC-A	11≤n≤12	48≤d≤57
66	UPC-E	11≤n≤12	48≤d≤57
67	JAN13 (EAN)	12≤n≤13	48≤d≤57
68	JAN8 (EAN)	7≤n≤8	48≤d≤57
69	CODE39	1≤n≤255	48≤d≤57, 65≤d≤90 32, 36, 37, 43, 45, 46, 47
70	ITF	1≤n≤255 (an even number)	48≤d≤57
71	CODEBAR	1≤n≤255	48≤d≤57, 65≤d≤68 36, 43, 45, 46, 47, 58
72	CODE93	1≤n≤255	0≤d≤127
73	CODE128	2≤n≤255	0≤d≤127

[Caution] For (1):

- This command ends with a NUL code.
- For UPC-A or UPC-E, the bar code is printed when 12 bytes of bar code data has been entered, and the subsequent data is handled as normal data.

- For JAN13, the bar code is printed when 13 bytes of bar code data has been entered, and the subsequent data is handled as normal data.
- For JAN8, the bar code is printed when 8 bytes of bar code data has been entered, and the subsequent data is handled as normal data.
- The data of ITF bar code must have an even number of columns. Should the data have an odd number of columns, the last column is ignored.

For (2):

- Numeral "n" indicates the number of columns in the data, so that "n" bytes of the subsequent data is handled as bar code data.
- If "n" is out of the range, the command handling is aborted, so that the subsequent data is handled as normal data.

For Standard mode:

- If "d" is out of the range, only a paper feed is executed, and the subsequent data is handled as normal data.
- If the bar code is wider than the print area for one line, the bar code is not printed, but only a paper feed is executed.
- The amount of paper feed corresponds to the height of the bar code (including the HRI characters if HRI character printing is specified), irrespective of the line feed width set by a command such as ESC 2 or ESC 3.
- This command only works if no data exists in the print buffer. If any data exists in the print buffer, the data subsequent to "m" is handled as normal data.
- After the bar code is printed, the beginning of the line is taken as the start position for the next print.
- This command is not affected by any print modes (highlighting, double printing, underline, and character size), except for the 90°-right-turned character mode.

For Page mode:

- This command only maps the bar code, without performing a printout. After the bar code is mapped, the next dot to the last column of the bar code is taken as the start position for the next data mapping.
- If "d" is out of the range, the command handling is aborted, so that the subsequent data is handled as normal data. In this case, the data mapping start position does not move.
- If the bar code is wider than the print area, the bar code is not printed, but the data mapping start position is moved to the left end outside the print area.

[Default] Undefined

[Description of Bar Codes] <For print examples, see page 108.>

UPC-A This bar code, consisting of numerals only, has a fixed length of 12 columns; a 11-column number entered from the host or application software plus a check column(12th column) automatically calculated inside the printer. If the 12th-column numeral is sent from the host, the entire bar code will be printed as it is.

UPC-E This bar code, consisting of numerals only, has a fixed length of 8 columns; the first number system character is "0" stationary. A 12-column numeral entered from the host or application software is compressed to 8 columns with a check column and printed. The 12th-column check column is automatically calculated inside the printer and sent from the host, the entire bar code will be printed, compressed to 8 columns.

JAN-13(EAN) This bar code, consisting of numerals only, has a fixed length of 13 columns; a 12-column number entered from the host or application software plus a check column(13th column) automatically calculated inside the printer. If the 13th-column numeral is sent from the host, the entire bar code will be printed as it is.

JAN-8(EAN) This bar code, consisting of numerals only, has a fixed length of 8 columns; a 7-column number entered from the host or application software plus a check column(8th column) automatically calculated inside the printer. If the 8th-column numeral is sent from the host, the entire bar code will be printed as it is.

CODE39 This bar code, consisting of uppercase alphabets and numerals, has a variable length of columns. A start/stop code "∗" is automatically added by the printer. Available characters include a space and " $ % + – • / 0 1 2 3 4 5 6 7 8 9 " and uppercase alphabets.

ITF This bar code, consisting of numerals only, has a variable length of even digits. If an odd-column code is transferred, nothing will be printed.

CODABAR (NW-7)

This bar code, consisting of alphanumeric, has a variable length of columns. Available characters include " 0 1 2 3 4 5 6 7 8 9 A B C D $ + – . / : " A start/stop code is required; any one of A, B, C, and D is used.

CODE93 This bar code, consisting of alphanumeric and control characters, has a variable length of columns. The HRI character string is preceded by a "□" character. HRI characters for control characters (00H - 1FH, and 7FH) are each printed as a combination of a "■" character and an alphabet.

Control character		HRI character	Control character		HRI character
ASCII	Hex.		ASCII	Hex.	
NUL	00	■U	DLE	10	■P
SOH	01	■A	DC1	11	■Q
STX	02	■B	DC2	12	■R
ETX	03	■C	DC3	13	■S
EOT	04	■D	DC4	14	■T
ENQ	05	■E	NAK	15	■U
ACK	06	■F	SYN	16	■V
BEL	07	■G	ETB	17	■W
BS	08	■H	CAN	18	■X
HT	09	■I	EM	19	■Y
LF	0A	■J	SUB	1A	■Z
VT	0B	■K	ESC	1B	■A
FF	0C	■L	FS	1C	■B
CR	0D	■M	GS	1D	■C
SO	0E	■N	RS	1E	■D
SI	0F	■O	US	1F	■E
			DEL	7F	■T

CODE128 This bar code consists of 103 bar code characters and three codesets, enabling 128 ASCII code characters to be printed. It has a variable length of columns.

- Codeset A ASCII characters 00H - 5FH can be represented.
- Codeset B ASCII characters 20H - 7FH can be represented.
- Codeset C Two-digit numbers 00 - 99 can each be represented by one character.

In addition to the above characters, special characters are available:

- Shift character (SHIFT)

  When used in codeset A, the next one character to a Shift character is treated as a character of codeset B. When used in codeset B, the next one character to a Shift character is treated as a character of codeset A. The Shift character cannot be used in codeset C.

- Codeset select characters (CODE A, CODE B, CODE C)

  The codeset following a codeset select character is switched to codeset A, B, or C.

- Function characters (FNC1, FNC2, FNC3, FNC4)

  How the function characters are used depends on each application. In codeset C, only FNC1 is available.

When sending print data, note these:

(1) Each string of bar code data must begin with a codeset select character (CODE A, CODE B, or CODE C), which selects the first codeset to use.

(2) Every special character is specified by a combination of two characters: a brace "{" followed by one character. A brace "{" itself is specified by two consecutive braces "{{."

Special characters

Hex.	ASCII	Codeset A	Codeset B	Codeset C
7B 53	{ S	SHIFT	SHIFT	–
7B 41	{ A	–	CODE A	CODE A
7B 42	{ B	CODE B	–	CODE B
7B 43	{ C	CODE C	CODE C	–
7B 31	{ 1	FNC1	FNC1	FNC1
7B 32	{ 2	FNC2	FNC2	–
7B 33	{ 3	FNC3	FNC3	–
7B 34	{ 4	FNC4	FNC4	–
7B 7B	{ {	{	{	{

<Example> To print "No." in codeset B, followed by "123456" in codeset C, send the following data string:

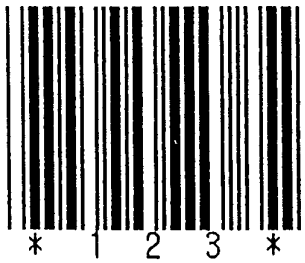
GS k <73><10><7BH 42H> "No." <7BH 43H><12><34><56>

- If the printer finds a string of bar code data that does not begin with a codeset select character, it immediately aborts the command processing and handles the subsequent data as normal data.
- If the printer received a character that is not available in the currently selected codeset, it immediately aborts the command processing and handles the subsequent data as normal data.
- An HRI character corresponding to either a Shift character or a code select character is not printed. An HRI character for either a function character or a control character is treated as a space character.

[Sample Program]

```
LPRINT CHR$ (&H1D) ; "H" ; CHR$ (2) ;
LPRINT CHR$ (&H1D) ; "k" ;
LPRINT CHR$ (4) ;
LPRINT "123" ; CHR$ (0) ;
```

[Print Results]



When the data "123" is printed with the code 39

[Description of Bar Codes]

UPC-A, UPC-E, JAN-13 (EAN), JAN-8 (EAN), CODE39, ITF, CODABAR, CODE93, CODE128

Type	Print Sample	Outline of Symbol	Max. column
UPC-A	Bar Code 1	12-column fixed-length bar code consisting of numerals only	–
UPC-E	Bar Code 2	8-column fixed-length bar code consisting of numerals only. Abbreviated version of UPC-A	–
JAN-13	Bar Code 3	13-column fixed-length bar code consisting of numerals only	–
JAN-8	Bar Code 4	8-column fixed-length bar code consisting of numerals only	–
CODE39	Bar Code 5	Variable-length bar code consisting of alphabets and numerals. The start/stop code "*" is automatically added.	15
ITF	Bar Code 6	Even-column variable-length bar code consisting of numerals only	30
CODABAR (NW-7)	Bar Code 7	Variable-length bar code consisting of alphanumeric characters. Any one of A, B, C, and D is required as the start/stop code.	21
CODE93	Bar Code 8	Variable-length bar code consisting of alphanumeric and control characters.	18
CODE128	Bar Code 9	Variable-length bar code consisting of all 128 ASCII code characters.	20

Printing is done depending on bar code specification type, number of print digits, bar code height, width (magnification), HRI character presence, and bar code data specification.

GS r n

[Function] Sending status

[Code] <1D>H<72>H<n>

[Range] $1 \leq n \leq 2$

$49 \leq n \leq 50$

[Outline] Sends the specified status to the host.

n = 1, 49: Sends the paper detector status.

n = 2, 50: Sends the drawer kick connector status.

[Caution]
- When the serial interface is used:
  For DTR/DSR control:
  The printer sends the status after verifying that the host is ready to receive. If the host is not ready to receive, the printer waits for the host to become ready to receive.
  For XON/OFF control:
  The printer sends the status without checking whether the host is ready to receive or busy.
- Because this command is executed when data is mapped in the receive buffer, there may be a delay between receiving the command and sending the status depending on the condition of the receive buffer.
- If ASB (automatic status back) is enabled by GS a, the host must discriminate between the status due to this command and the status due to ASB.

- Paper detector status (n = 1, 49)

Bit	Status	Hex.	Decimal
0,1	Paper found by paper near end detector	00	0
	Paper not found by paper near end detector	03	3
2,3	Paper found by paper end detector	00	0
	Paper not found by paper end detector	(0C)	(12)
4	Unused	00	0
5	Undefined	—	—
6	Undefined	—	—
7	Unused	00	0

Bits 2, 3: Whenever the paper end detector detects a "paper out" state, the printer goes offline, and the command is not executed. The printer, therefore, never sends a status where bit 2 = "1" or bit 3 = "1".

• Drawer kick connector status (n = 2, 50)

Bit	Status	Hex.	Decimal
0	Status of pin 3 of drawer kick connector = "L"	00	0
	Status of pin 3 of drawer kick connector = "H"	01	1
1	Undefined	—	—
2	Undefined	—	—
3	Undefined	—	—
4	Unused	00	0
5	Undefined	—	—
6	Undefined	—	—
7	Unused	00	0

[See Also] DLE EOT, GS a, "Identification of Send Status" in Appendix 3

GS w n

[Function] Specifying the horizontal size (magnification) of bar code

[Code] <1D> H <77> H <n>

[Range] $2 \leq n \leq 6$

[Outline] Selecting bar code width.

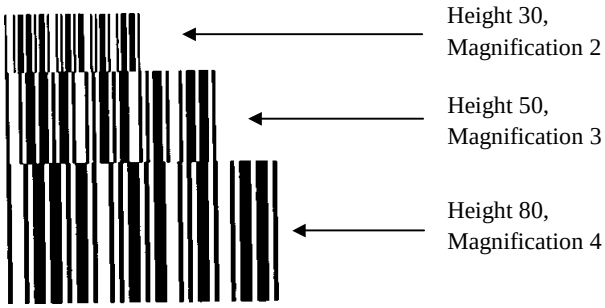
"n" denotes the number of dots in fine element width.

[Default] n = 3

[Sample Program]

```
LPRINT CHR$ (&H1D) ; "h" ; CHR$ (30) ;
LPRINT CHR$ (&H1D) ; "w" ; CHR$ (2) ;
GOSUB *BC
LPRINT CHR$ (&H1D) ; "h" ; CHR$ (50) ;
LPRINT CHR$ (&H1D) ; "w" ; CHR$ (3) ;
GOSUB *BC
LPRINT CHR$ (&H1D) ; "h" ; CHR$ (80) ;
LPRINT CHR$ (&H1D) ; "w" ; CHR$ (4) ;
GOSUB *BC
END
*BC :
LPRINT CHR$ (&H1D) ; "k" ;
LPRINT CHR$ (4) ;
LPRINT "12" ; CHR$ (0) ;
RETURN
```

[Print Results]



11. CHARACTER CODES TABLE

11.1 CodePage 00H to 7FH & PC437(USA, European, Standard)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	DLE		0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1		XON	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2			"	2	B	R	b	r	é	Æ	ó	▒	┬	╥	Γ	≥
3		XOF	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	EOT		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	ENQ		%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6			&	6	F	V	f	v	å	û	ª	┤	╞	╓	μ	÷
7			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	HT		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	θ	∙
A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B		ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	■	δ	√
C	FF	FS	,	<	L	\	l	|	î	£	¼	╝	╠	▬	∞	n
D	CR	GS	-	=	M	]	m	}	ì	Y	¡	╜	═	▌	φ	²
E			.	>	N	^	n	~	Ä	Pt	«	╛	╬	▐	∈	■
F			/	?	O	_	o	SP	Å	ƒ	»	┐	╧	▀	∩	SP

11.2 Code Page Katakana(Japanese)

	8	9	A	B	C	D	E	F
0	_	┴		―	タ	ミ	三	×
1	▂	┬	｡	ア	チ	ム	上	円
2	▃	┤	｢	イ	ツ	メ	中	年
3	▄	├	｣	ウ	テ	モ	下	月
4	▅	―	、	エ	ト	ヤ	◢	日
5	▆	‗	・	オ	ナ	ユ	◣	時
6	▇	‖	ヲ	カ	ニ	ヨ	◥	分
7	▇	｜	ァ	キ	ヌ	ラ	◤	秒
8	▏	┌	ィ	ク	ネ	リ	♠	〒
9	▏	┐	ゥ	ケ	ノ	ル	♥	市
A	▏	└	ェ	コ	ハ	レ	♦	区
B	▏	┘	ォ	サ	ヒ	ロ	♣	町
C	▏	(	ャ	シ	フ	ワ	●	村
D	▏	)	ュ	ス	ヘ	ン	○	人
E	▏	〔	ョ	セ	ホ	゛	／	▩
F	┼	〕	ッ	ソ	マ	゜	＼	

11.3 Codepage PC850(Multilingual)

	8	9	A	B	C	D	E	F
0	Ç	É	á	▒	└	∂	Ó	—
1	ü	æ	í	▒	┴	Ð	ß	±
2	é	Æ	ó	▒	┬	Ê	Ô	=
3	â	ô	ú	│	├	Ë	Ò	¾
4	ä	ö	ñ	┤	─	È	õ	¶
5	à	ò	Ñ	Á	┼	€	Õ	§
6	å	û	ª	Â	ã	Í	µ	÷
7	ç	ù	º	À	Ã	Î	Þ	¸
8	ê	ÿ	¿	©	╚	Ï	þ	°
9	ë	Ö	®	╣	╔	┘	Ú	¨
A	è	Ü	¬	║	╩	┌	Û	·
B	ï	ø	½	╗	╦	■	Ù	¹
C	î	£	¼	╝	╠	▬	ý	³
D	ì	Ø	¡	¢	═	¦	Ý	²
E	Ä	×	«	¥	╬	ì	¯	■
F	Å	ƒ	»	┐	¤	▬	´	SP

11.4 Codepage PC860(Portguese)

	8	9	A	B	C	D	E	F
0	Ç	É	á	⣿	└	┴	α	≡
1	ü	À	í	▓	┴	┬	β	±
2	é	È	ó	▒	┬	┬	Γ	≧
3	â	ô	ú	│	├	└	π	≦
4	ã	õ	ñ	┤	─	┖	Σ	⌠
5	à	ò	Ñ	┤	┼	┍	σ	⌡
6	Á	Ú	a	┤	├	┌	μ	÷
7	ç	ù	o	┐	├	┼	τ	≈
8	ê	Ì	¿	┐	┖	┼	Φ	°
9	Ê	Õ	Ò	┤	┍	┘	θ	∙
A	è	Ü	¬	│	┴	┌	Ω	·
B	Í	¢	½	┐	┬	▉	δ	√
C	Ô	£	¼	┘	├	▄	∞	n
D	ì	Ù	¡	┘	─	▌	φ	2
E	Ã	Pt	«	┘	┼	▌	∈	■
F	Â	Ó	»	┐	┴	▀	∩	

11.5 Codepage PC893(Canadian-French)

	8	9	A	B	C	D	E	F
0	Ç	É	¦	▒	└	╨	α	≡
1	ü	È	'	▒	┴	╤	ß	±
2	é	Ê	ó	▒	┬	╥	Γ	≥
3	â	ô	ú	│	├	╙	π	≤
4	Â	Ë	¨	┤	─	╘	Σ	⌠
5	à	Ï	˃	╡	┼	╒	σ	⌡
6	¶	û	³	╢	╞	╓	µ	÷
7	ç	ù	¯	╖	╟	╫	τ	≈
8	ê	¤	Î	╕	╚	╪	φ	°
9	ë	Ô	⌠	╣	╔	┘	θ	∙
A	è	Ü	¬	║	╩	┌	Ω	·
B	ï	¢	½	╗	╦	■	δ	√
C	î	£	¼	╝	╠	▬	∞	n
D	=	Ù	¾	╜	═	▮	Ø	²
E	À	Û	«	╛	╬	▮	∈	■
F	§	ƒ	»	┐	╧	▬	∩	SP

11.6 Codepage PC865(Nordic)

	8	9	A	B	C	D	E	F
0	Ç	É	á	▒	└	╨	α	≡
1	ü	æ	í	▒	┴	╤	β	±
2	é	Æ	ó	▒	┬	╥	Γ	≥
3	â	ô	ú	│	├	╙	π	≤
4	ä	ö	ñ	┤	─	╘	Σ	⌠
5	à	ò	Ñ	╡	┼	╒	σ	⌡
6	å	û	ª	╢	╞	╓	µ	÷
7	ç	ù	º	╖	╟	╫	τ	≈
8	ê	ÿ	¿	╕	╚	╪	Φ	°
9	ë	Ö	⌐	╣	╔	┘	θ	∙
A	è	Ü	¬	║	╩	┌	Ω	·
B	ï	¢	½	╗	╦	■	δ	√
C	î	£	¼	╝	╠	▬	∞	n
D	ì	¥	¡	╜	═	▌	φ	²
E	Ä	₧	«	╛	╬	▐	∈	■
F	Å	ƒ	»	┐	╧	▀	∩	SP

11.7 Blank page(For user setting)

	8	9	A	B	C	D	E	F
0	SP	SP	SP	SP	SP	SP	SP	SP
1	SP	SP	SP	SP	SP	SP	SP	SP
2	SP	SP	SP	SP	SP	SP	SP	SP
3	SP	SP	SP	SP	SP	SP	SP	SP
4	SP	SP	SP	SP	SP	SP	SP	SP
5	SP	SP	SP	SP	SP	SP	SP	SP
6	SP	SP	SP	SP	SP	SP	SP	SP
7	SP	SP	SP	SP	SP	SP	SP	SP
8	SP	SP	SP	SP	SP	SP	SP	SP
9	SP	SP	SP	SP	SP	SP	SP	SP
A	SP	SP	SP	SP	SP	SP	SP	SP
B	SP	SP	SP	SP	SP	SP	SP	SP
C	SP	SP	SP	SP	SP	SP	SP	SP
D	SP	SP	SP	SP	SP	SP	SP	SP
E	SP	SP	SP	SP	SP	SP	SP	SP
F	SP	SP	SP	SP	SP	SP	SP	SP

11.8 International Character Codes Table

	Nation	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
0	U.S.A.	#	$	@	[	\	]	^	‘	{	|	}	~
1	France	#	$	à	°	ç	§	^	‘	é	ù	è	¨
2	Germany	#	$	§	Ä	Ö	Ü	^	‘	ä	ö	ü	β
3	U.K.	£	$	@	[	\	]	^	‘	{	|	}	~
4	Denmark 1	#	$	@	Æ	Ø	Å	^	‘	æ	ø	å	~
5	Sweden	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6	Italy	#	$	@	°	\	é	^	ù	à	ò	è	ì
7	Spain	Pt	$	@	¡	Ñ	¿	^	‘	¨	ñ	}	~
8	Japan	#	$	@	[	¥	]	^	‘	{	|	}	~
9	Norway	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10	Denmark 2	#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

APPENDIX 1. PAGE MODE

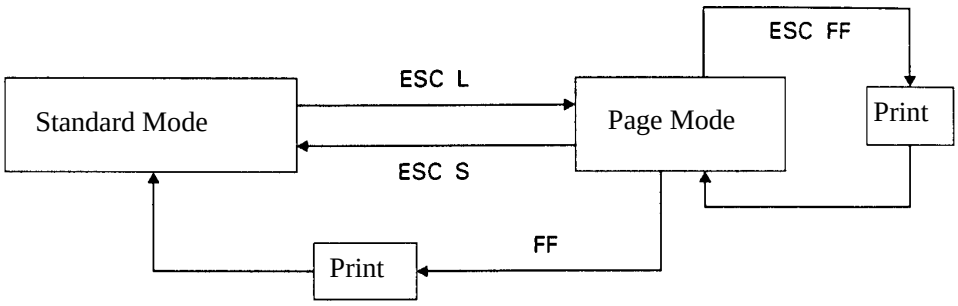
Overview

The printer has two print modes: standard and page.

In standard mode, the printer prints or feeds paper each time it receives a print or paper feed command. In page mode, when the printer receives print commands and/or form feed commands, it simply forwards them to the specified print area of memory. Only when an ESC FF or FF is executed, will all data mapped in the print area until then be printed in a batch.

For example, suppose you executed a print and line feed for data "ABCDEF"<LF>. In standard mode, the data "ABCDEF" is printed and paper is advanced one line. In page mode, the data "ABCDEF" is written in the specified print area of memory, and the memory location for the storage of the next print data is shifted one line.

The printer enters page mode with an ESC L, so that all commands received after that point are handled in page mode. When an ESC FF is executed, the data received until then is printed in a batch. When an FF is executed, the data received until then is printed in a batch, after which the printer returns to standard mode. An ESC S causes the printer to immediately return to standard mode; any print data, however, that has been stored in page mode is not printed. Instead it shall be deleted.



[Switching Between Standard Mode and Page Mode]

Command values in standard mode and page mode:

(1) The values set with commands are common to the standard and page modes. The values set with any of the four commands listed below are, however, treated differently and stored separately for the standard and page modes.

ESC SP, ESC 2, ESC 3, FS S

(2) The maximum printable size of a bitmap image is 512 by 512 dots for standard mode. In page mode, the size can be extended up to 831 bits in the y direction (paper feed direction) if 831 bits are reserved for y of the print area and the value of print direction "n" specified by ESC T is 1 or 3.

Mapping of print data in the print area

Print data is mapped in the print area as follows:

(1) The print area is set by ESCW. When the printer has finished all of the print and paper feed actions specified before receiving an ESC W, the ESC W sets the left end (as viewed facing the printer) as the start point (x0, y0) of the print area. The print area is a rectangle defined by two edges extending from the start point (x0, y0): one edge running in the x (horizontal) direction by dx pitch (inclusive of the start point), and the other running in the y (vertical) direction by dy pitch. (If no ESC W is defined, the default values are used to define the print area.)

(2) With a print area defined by ESC W and a print direction specified by ESC T, when the printer receives print data, the print data is mapped in the print area where point A (see the figure "Mapping Position for Character Data") is used as the initial value of the start point. If the print data consists of characters, this start point serves as the baseline.

If the print data is a downloaded bitmap image or a bar code, the print data is mapped with its lower-left point "B" aligned to the baseline (see the figure "Mapping Positions for Print Data"). When attempting to map the HRI characters of a bar code, however, the section above the standard character height will not be printed.

(3) If print data (or the space to the right of a character) extends beyond the print area before command that involves a line feed (for example, LF or ESC J command) is received, a line feed is automatically executed, so that the mapping position of the print data is moved one line. The next mapping position will be the beginning of the line. In this case, the line feed width is as defined by a command such as ESC 2 or ESC 3.

(4) By default, the line feed width is 1/6 inch, which is equivalent to 30 dots. If the print data for the next line includes a vertically doubled character or taller, a downloaded bitmap image extending two or more lines, or a bar code taller than the character height, the data, therefore, falls short of the line feed width, causing the upper dots of the character to overlap the print data of the current line. The line feed width needs to be increased.

In the following example the line feed width for the first line should equal at least 27 dots (see the figure "Mapping Position for a Downloaded Bitmap Image").

<Example: When printing a downloaded bitmap image covering six bytes vertically>

[Vertically mapped dots (= 8×6) — Line feed width for the starting point (= 21)]×(Vertical basic calculation pitch conversion ratio (= 360/180) = 54

54 pitches, or 27 dots, must, therefore, be added to the line feed width.

ESC W, xL, xH, yL, yH, dxL, dxH, dyL, dyH

ESC Tn

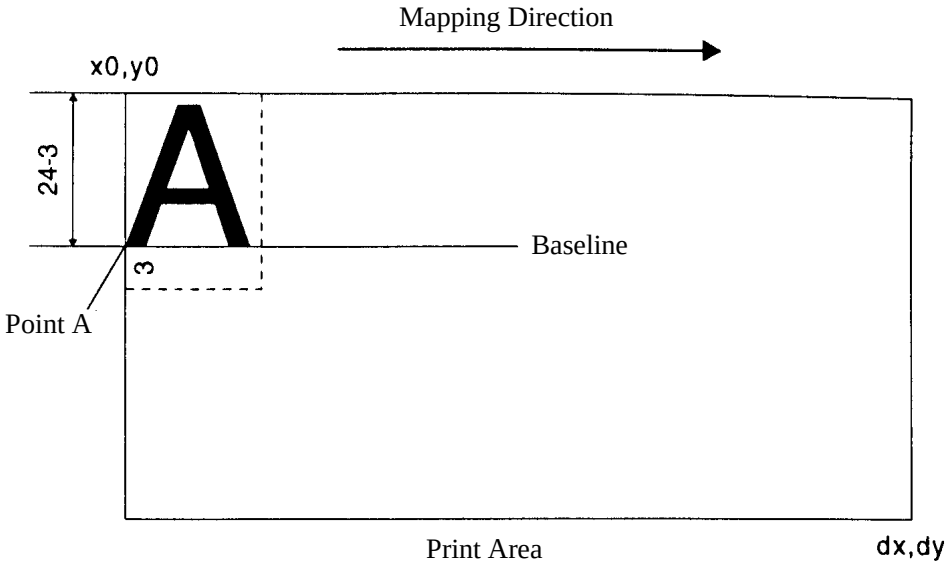
ESC 3 54 ←(Additional line feed width)

LF

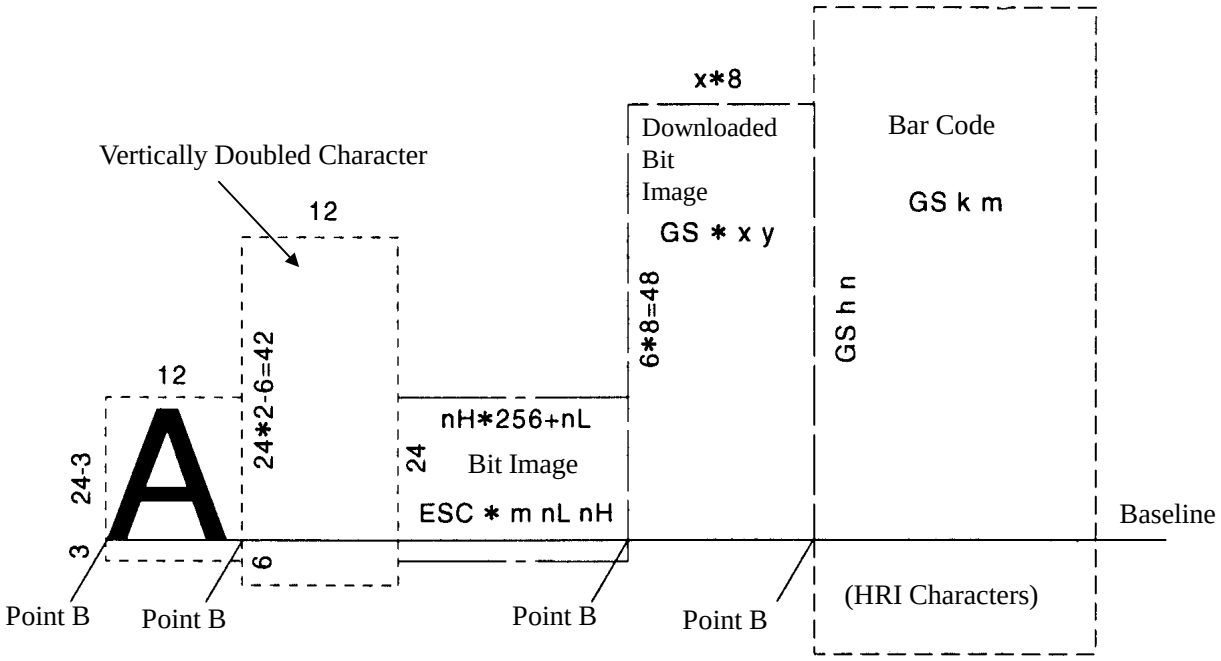
GS/1

ESC2 ←(Return the line feed width to 1/6 inch)

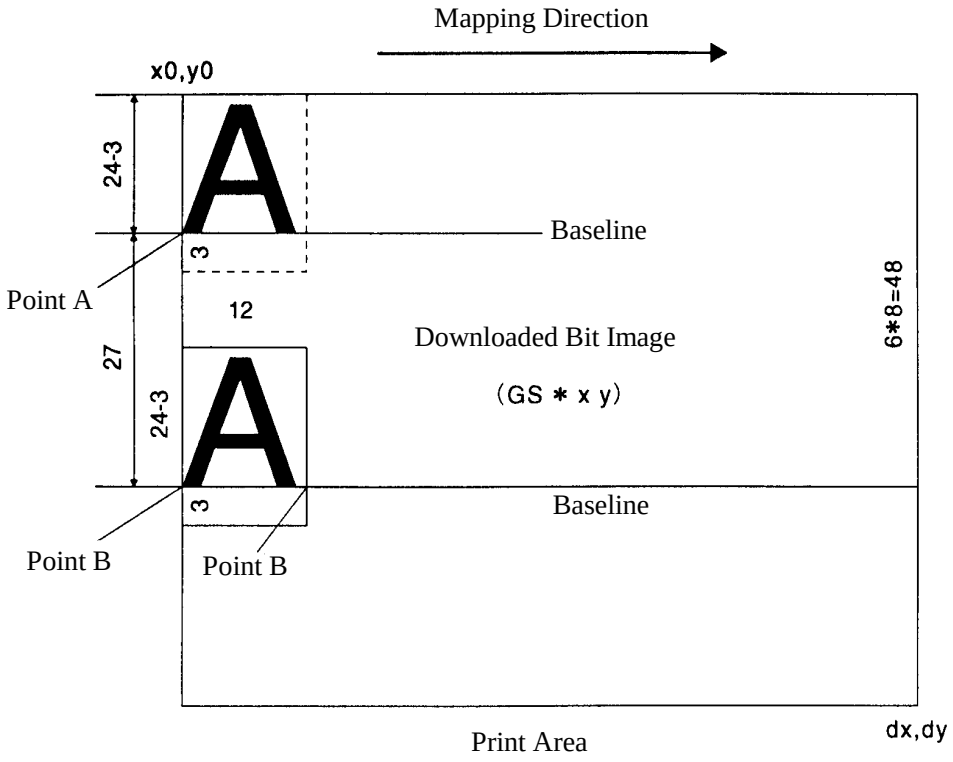
Note: Because the default of the basic calculated pitch is 1/180 for the horizontal direction and 1/360 for the vertical direction, some error can occur, such as position specification, depending on the print direction. No error occurs if the basic calculated pitch for the vertical direction is set to 1/180 by the GSP command.



[Mapping Positions for Character Data]



[Mapping Position for Print Data]



[Mapping Position for a Downloaded Bit Image]

Example of the Use of Page Mode

The following explains specific uses of page mode.

When in page mode, the commands are typically sent from the host to the printer in the following sequence:

(1) An ESC L puts the printer in page mode.

(2) An ESC W specifies the print area.

(3) An ESC T specifies the print direction.

(4) Print data is sent.

(5) An FF instructs the printer to print the print data in a batch.
After printing, the printer returns to standard mode.

<Example 1>

```
100 PRINT#1, chr$(&H1b); "L"
110 PRINT#1, chr$(&H1b); "W";chr$(0);chr$(0);chr$(0);chr$(0);
120 PRINT#1, chr$(200) ;chr$(0);chr$(144);chr$(1);
130 PRINT#1, chr$(&H1b); "T";chr$(0);
140 PRINT#1, "Page mode lesson Test1"
150 PRINT#1, chr$(&Hc);
```

The program in Example 1 reserves a print area of 200 (400 pitches extending from the start point (0, 0)), and then prints the text "Page mode lesson Test 1" on the first line of the print area as shown in

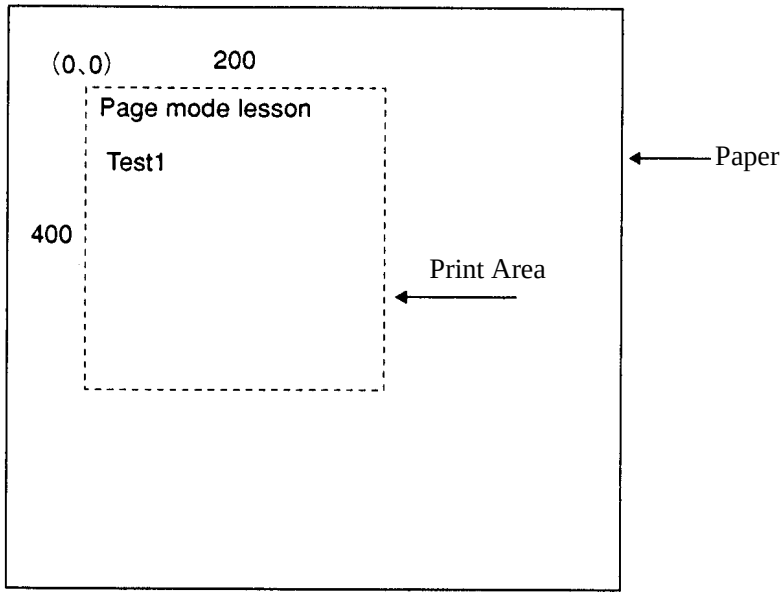


Figure 1-1

In Figure 1-1, a line feed occurs between "lesson" and "Test 1" because "lesson" and the next space " " do not fit in the horizontal range of the 200 (400)-pitch print area. The line feed width conforms to the value specified by a command such as ESC 3.

It is possible to set as many print areas as desired before executing FF. If print areas overlap each other, the print area setup data are ANDed with the previous data.

If you want to erase a section of mapped data, use the CAN command. The CAN command erases all data in the print area being specified. You can, therefore, use an ESC W to define a print area that encloses the section you want to erase, and then execute the CAN command, so that the section of the data is erased.

It is important to remember that any part of a character that overlaps with the specified print area will be erased.

<Example 2>

```
100 PRINT#1, chr$(&H1b); "L"
110 PRINT#1, chr$(&H1b); "W";chr$(0);chr$(0);chr$(0);chr$(0);
120 PRINT#1, chr$(200) ;chr$(0);chr$(144);chr$(1);
130 PRINT#1, chr$(&H1b); "T";chr$(0);
140 PRINT#1, "Page mode lesson 2 CAN command"
150 PRINT#1, chr$(&HA);
160 PRINT#1, "ABCDEFGHIJKLMNOPQRST1234567890"
170 PRINT#1, chr$(&Hc);
```

First, an ESC L is sent to switch to page mode (line 100). Next, an ESC W is used to send eight arguments, n1 to n8, to reserve a print area. In this example, the arguments are sent in the sequence of 0, 0, 0, 0, 200, 0, 144, and 1, to reserve a print area that measures 200 from the start point (0, 0) in the x direction and 400 in the y direction (lines 110 - 120). Furthermore, an ESC T is used to specify the print direction to be 0 (line 130).

After the above setup, print data is sent (lines 140 - 160). Finally, an FF is sent (line 170) to produce a print-out as shown in Figure 1-2.

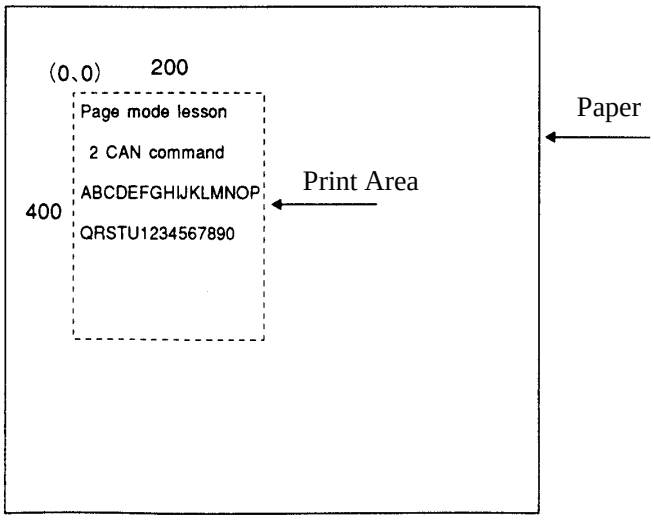


Figure 1-2

Before an FF is sent, the following program code can be added to remove part of the data.

```
170 PRINT#1, chr$(&H1b); "W";chr$(72);chr$(0);chr$(120);chr$(0);
180 PRINT#1, chr$(36) ;chr$(0);chr$(48);chr$(0);
190 PRINT#1, chr$(&H18);
200 PRINT#1, chr$(&Hc);
```

As a result of the additional program code, a print-out is executed as shown in Figure 1-3, where the string "GH1" is removed. When strings are removed with CAN, the area where the string would have been is not used by the rest of the data, instead it is converted into a sequence of spaces.

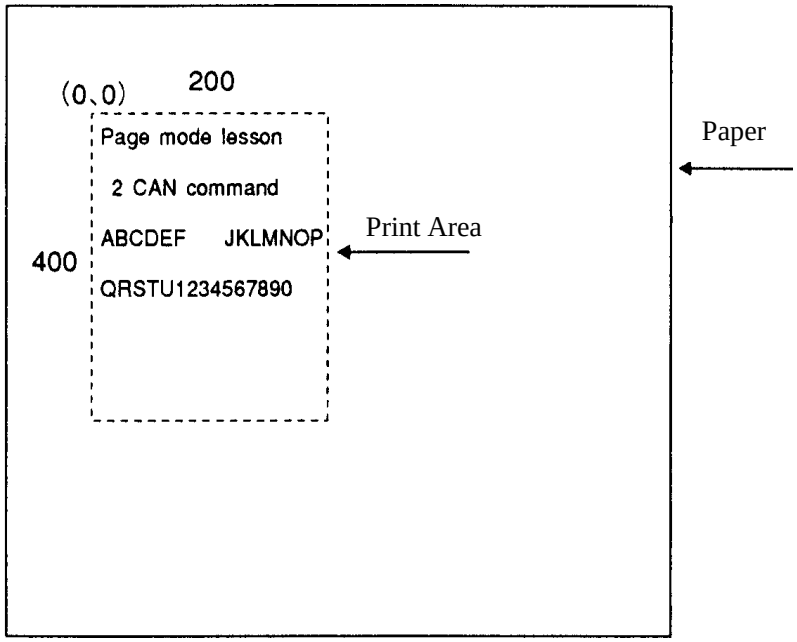


Figure 1-3

APPENDIX 2. BI-DIRECTIONAL PARALLEL INTERFACE

1. Overview

The interface of the printer is a Level-1 compatible device according to IEEE-P1284. It supports the communication modes described in 1.1 below.

1.1. Parallel Interface Communication Modes

The parallel interface of the printer provides three communication modes as outlined below. When the printer is turned on or reset, it defaults to Compatibility mode.

• Compatibility Mode

Data is transmitted from the host to the printer in units of one byte. Usually, this mode is used for data transmission. You may switch to the other modes from Compatibility mode.

• Nibble Mode

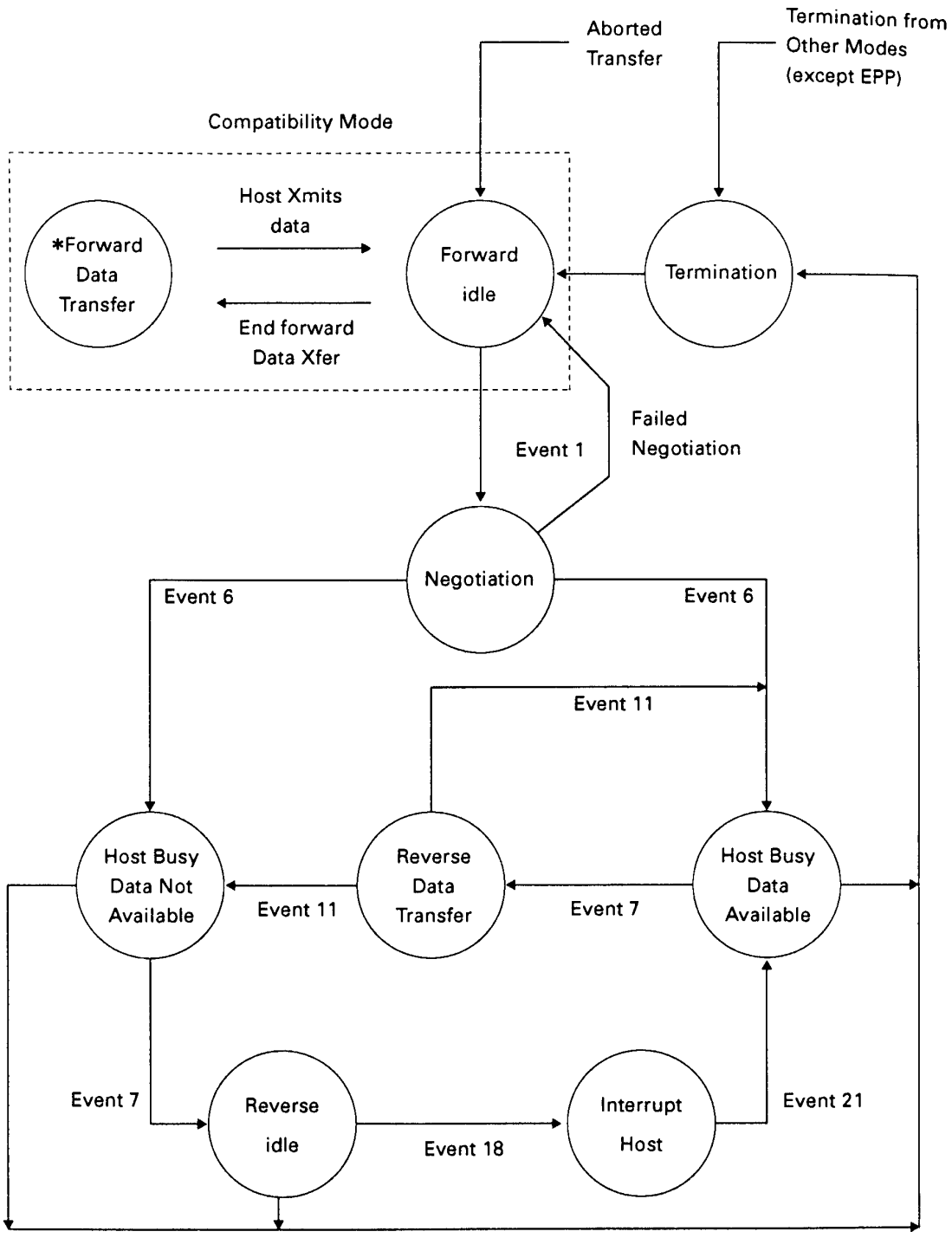
Data is transmitted from the printer to the host in units of four bits. The data transmission from the printer uses a status signal line. To send one byte of data in this mode, two sets of four-bit data are sent consecutively.

• Byte Mode

Data is transmitted from the printer to the host in units of one byte. Data transmission from the printer uses an 8-bit data signal line. For Byte mode, the host must be capable of toggling the signal direction over the 8-bit data signal line. Communication from the host to the printer is called Forward mode, while communication from the printer to the host is called Reverse mode.

1.2 Interfacing Phases

Interfacing in each communication mode is divided into several phases. In addition, there is a phase for mode initialization, as well as a phase for mode switching. Interface signals may differ in name and function for different modes and different phases.



2. Negotiation

2.1 Overview

Usually, the printer is started in Compatibility mode, which corresponds to the Centronics interface phase. When the host intends to switch to the Nibble or Byte mode, it sends a request and negotiates with the printer. A general flow of negotiations is given below.

1) The host sets the IEEE 1284 Active signal to High. In response, the printer moves into the Negotiation phase.
2) The printer replies whether it can execute the mode requested by the host.
3) The interface terminates the Negotiation phase and moves into the communication phase.

2.2 Negotiation Procedure

The negotiations proceed as follows:

1) In IEEE 1284 communication phase, the host and printer are in Compatibility mode by default. It remains in Compatibility mode as long as the host recognizes the connected device as an IEEE 1284 compatible device.
2) To start negotiations, the host sets the communication mode request bit on the data path. (Event 0)
3) The host sets IEEE 1284 Active (nSelectln) to High, and HostBusy (nAutoFd) to Low. (Event 1)
4) The printer responds by setting PtrClk (nAck) to Low, nDataAvail (nFault) to High, Xflag (Select) to High, and AckDatReq (PError) to High. (Event 2)
5) The host sets HostClk (nStrobe) to Low. In response, the printer latches the data of the communication mode request bit. (Event 3)
6) The host sets HostClk (nStrobe) and HostBusy (nAutoFd) to High. (Event 4)
7) If the printer has communication data to send to the host, it sets AckDataReq (PError) to Low, nDataAvail (nFault) to Low, and Xflag (Select) to the value corresponding to the communication mode. (Event 5)

   Xflag: Nibble Mode: Low, Byte Mode: High
8) The printer sets PtrClk (nAck) to High to indicate that it is ready to read the status line. (Event 6)
9) If the printer has communication data to send to the host, the host moves into the Host Busy Available phase or Termination phase, and then returns to the Compatibility mode.
10) If the printer has no communication data to send to the host, the host moves into the Host Busy Data Not Available phase or Termination phase, and then returns to the Compatibility mode.
11) If the printer cannot support the communication mode requested by the host, it sets Xflag (Select) as follows:

    When Nibble mode is requested: High

    When Byte mode is requested: Low

2.3 Precautions

1) The Negotiation phase is triggered with the rising edge of the IEEE 1284 Active signal sent by the host.
2) In Compatibility mode, the time when the negotiation process begins is, as a general rule, after the host sets nStrobe to High and then the printer outputs an nAck pulse.
   Once the nStrobe signal is set to High, however, the printer immediately moves into the Negotiation phase when the high state of IEEE 1284 Active is detected, even if the nAck pulse has yet to be output or is being output. In this case, if the printer has returned to Compatibility mode after Termination, no nAck pulse will be output.
3) Negotiations can be entered from the Busy or Error state of the Compatibility mode. In this case, the printer will not return to the Busy or Error state it was in before the negotiations, but will remain in the printer state it was in after Termination.
4) If the host requested a communication mode that is not supported by the printer, it must move into the Termination phase and return to the Compatibility mode.

Table 2.4.1 Definitions of Request Bits in IEEE 1284 Communication Mode

Bit	Definition	Bit Values (76543210)	Hex.	Xflag	
				When supported	In the printer
7	Request Extensibility Link	10000000	80H	High	Low
6	Request EPP Mode	01000000	40H	High	Low
5	Request ECP Mode with RLE	00110000	30H	High	Low
4	Request ECP Mode	00010000	10H	High	Low
3	Reserve	00001000	08H	High	Low
2	Request Device ID: Return Data Using				
	Nibble Mode Rev Channel Transfer	00000100	04H	High	High
	Byte Mode Rev Channel Transfer	00000101	05H	High	High
	ECP Mode Transfer without RLE	00010100	14H	High	Low
	ECP Mode Transfer with RLE	00110100	34H	High	Low
1	Reserve	00000010	02H	High	Low
0	Byte Mode Reverse Channel Transfer	00000001	01H	High	Low
None	Nibble Mode Reverse Channel Transfer	00000000	00H	Low	Low
	Illegal or Contradictory Request	Other than above	Other than above	—	Low

Note: The printer only supports the Nibble and Byte modes. For a request for any other mode, Xflag is set to Low.

2.4 Data Communication from Printer to Host

2.4.1 Nibble Mode

In this mode, data is transferred between the printer and the host through the procedure described below. The steps beginning from 1) are applicable when the Negotiation phase has switched to the Host Busy Data Available phase. If the Negotiation phase has switched to the Host Busy Data Not Available phase, the procedure starts at step 9).

1) After the negotiations for the entry into Nibble mode are completed, the host sets HostBusy (nAutoFd) to Low to indicate that it is ready to receive data from the printer. (Event 7)
2) The printer places the low-order four bits on the reverse channel data line and sets PtrClk (nAck) to Low. (Events 8 and 9)
3) The host sets HostBusy (nAutoFd) to High to indicate that it has latched data and received the signal in event 9. (Event 10)
4) The printer sets PtrClk (nAck) to High. This completes transfer of the first nibble. (Event 11)
5) Steps 1) to 3) are repeated to transfer the high-order four bits, before proceeding to steps 6) and on.
6) After the host has set HostBusy (nAutoFd) to High (event 10) and received data, the printer must set the four status lines as shown below. (Event 13)
   - PtrBusy (Busy): Returned to the status given in Forward mode.
   - nDataAvail (nFault): Set to Low if there is data to be sent.
   - AckDataReq (PError): Set to Low if there is data to be sent.
   - Xflag (Select): Set to the current mode (i.e., set to Low).
7) The printer sets PtrClk (nAck) to High. (Event 11)
8) After event 11, the host checks the signals set by the printer in event 13. With this check the host determines:
   1. Whether there is more data to be sent from the printer to the host;
   2. And whether data can be transferred from the host to the printer.
9) If there is no more data to be sent from the printer after the transfer of one byte (two nibbles), the host chooses one of three status selections:
   1. Performing Termination and returning to the Compatibility mode.
   2. Remaining in the Host Busy Data Not Available phase.
   3. Setting HostBusy (nAutoFd) to Low (event 7) and moving to the Reverse Idle phase.
10) If there is more data to be received from the printer, the host chooses one of three status selections:
   1. Setting HostBusy (nAutoFd) to Low and indicating that the host is ready to receive.
   2. Remaining in the Host Busy Data Available phase.
   3. Performing Termination and returning to the Compatibility mode.
11) If the host selected the Host Busy Data Available phase and set HostBusy (nAutoFd) to Low, the printer repeats the steps from 2) onwards.
12) If the host selected the Reverse Idle phase and new data becomes available to be sent from the printer, the printer sets PtrClk to Low to request the host for an interrupt. (Event 18)

13) The printer sets PtrClk back to High. (Event 19)
14) Upon receiving a request for interrupt from the printer, the host responds by setting HostBusy (nAutoFd) to High. (Event 20)
15) Finally, the printer responds to the host by setting AckDataReq (PError) to Low, and then the host moves to the Host Busy Data Available phase. (Event 21)

2.4.2 Byte Mode

In this mode, data is transferred between the printer and the host through the procedure described below. The steps beginning from 1) are applicable when the Negotiation phase has switched to the Host Busy Data Available phase. If the Negotiation phase has switched to the Host Busy Data Not Available phase, the procedure starts at step 9).

1) After the negotiations for the entry into the Byte mode are complete, the host indicates that it is ready to receive data from the printer. This is indicated by switching the data bus to a high-impedance state and setting HostBusy (nAutoFd) to Low. (Events 14 and 7)
2) The printer places communication data on the data bus. (Event 15)
3) The printer sets PtrClk (nAck) to Low. (Event 9)
4) The host sets HostBusy (nAutoFd) to High to indicate that it has latched data and received the signal in event 9. (Event 10)
5) The printer must set the four status lines as shown below. (Event 13)
   - PtrBusy (Busy): Returned to the status given in the Forward mode.
   - nDataAvail (nFault): Set to Low if there is data to be sent.
   - AckDataReq (PError): Set to Low if there is data to be sent.
   - Xflag (Select): Set to the status given during the last negotiation (i.e., set to Low).
6) The printer sets PtrClk (nAck) to High (event 10) and ends the Byte handshake (event 11).
7) The host indicates that it has succeeded in receiving the data. This is indicated by setting HostClk (nStrobe) to Low (Event 16) and then to High (Event 17).
8) Events 10 and 16 may occur simultaneously, and events 7 and 17 may occur simultaneously (such as when HostBusy and HostClk are used together). If this is the case, the host determines the current status by checking:
   1. Whether there is more data to be sent from the printer to the host;
   2. And whether data can be transferred from the host to the printer.

9) After transferring one byte of data, the printer signals to the host whether it has more data to transfer. When there is no more data to be received by the host from the printer, the host chooses one of three status selections:
   1. Performing Termination and returning to the Compatibility mode.
   2. Remaining in the Host Busy Data Not Available phase.
   3. Setting HostBusy (nAutoFd) to Low and moving to the Reverse Idle phase (Event 7).

10) When no more data is to be received from the printer, the host chooses one of three status selections:
    1. Setting HostBusy (nAutoFd) to Low and indicating that the host is ready to receive.
    2. Remaining in the Host Busy Data Available phase.
    3. Performing Termination and returning to the Compatibility mode.

2.5 Device ID

The device ID is a character string that provides the ID, the type, and other information regarding the printer connected to the interface. When the printer receives a request for a device ID from the host, it replies with the following device ID:

<00>h<2A>h
MFG : CBM ;
CMD : CBM ;
MDL : iDP3220 ;
CLS : PRINTER ;

The first two bytes of the device ID indicate the length of the entire device ID (including the first two bytes themselves). For a description of a request for a device ID, see the "Negotiation" section earlier in the present Appendix.

When the host receives the device ID string of the length indicated by the first two bytes, it must do so consecutively, without terminating the process until the entire device ID is received. If the process is terminated halfway, the printer discards the rest of the string; when the printer receives a new request for the device ID, it sends the device ID beginning from the first character of the ID. After receiving the ID of the length indicated by the first two bytes, the host must carry out the termination even if the printer has data to send (Data Available). If the host does not carry out Termination and tries to receive data, the printer sends the printer status.

2.6 Termination

Termination is the process of returning to Compatibility mode from the Nibble or Byte modes. When performing Termination, the host sets the signals as follows:

- IEEE 1284 Active (nSelectln): Low
- HostBusy (nAutoFd): High (Event 22)

There are two methods of Termination:

(1) Termination through a handshake between the host and the printer.

(2) Immediate termination.

(1) Termination through a handshake between the host and the printer:

When switching from Reverse mode to Compatibility mode, this termination method can be used if the interface is activated (IEEE 1284 Active: High) and event 22 has taken place.

1) The printer responds to IEEE 1284 Active by setting PtrBusy (Busy) and nDataAvail (nFault) to High. (Event 23)
2) The printer then inverts Xflag (Select) and sets PtrClk (nAck) to Low. (Event 24)
3) The host sets HostBusy (nAutoFd) to Low. (Event 25)
4) The printer returns nDataAvail (nFault), Xflag (Select), and AckDataReq (PError) to the status given in the Compatibility mode, and sets PtrClk (nAck) to High. (Events 26 and 27)
5) The host sets HostBusy (nAutoFd) to High to terminate the handshake and return the interface to the Compatibility Mode Idle phase. (Event 28)
6) The printer changes PtrBusy (Busy) to be able to receive data from the host.

(2) Immediate termination:

1) If the interface is deactivated (IEEE 1284 Active: Low) without event 22 having taken place, the printer immediately performs Termination. In this termination, the data is not guaranteed, and the printer switches the data bus from output to input within 1 µsec.

In the Reverse Idle phase the printer can notify the host that it has data to transfer to the host. The notification may occur simultaneously with termination in order for the host to move from the Idle phase to the Compatibility mode.

If the printer has data to send, it initiates the Interrupt phase indicated by events 8 and 9. In this case, if 128 - Active (nSelectIn) was set to Low before HostBusy (nAutoFd) changed from High to Low, the printer interprets that the host has switched to the Termination phase and completed the normal termination handshake.

APPENDIX 3. IDENTIFICATION OF SEND STATUS

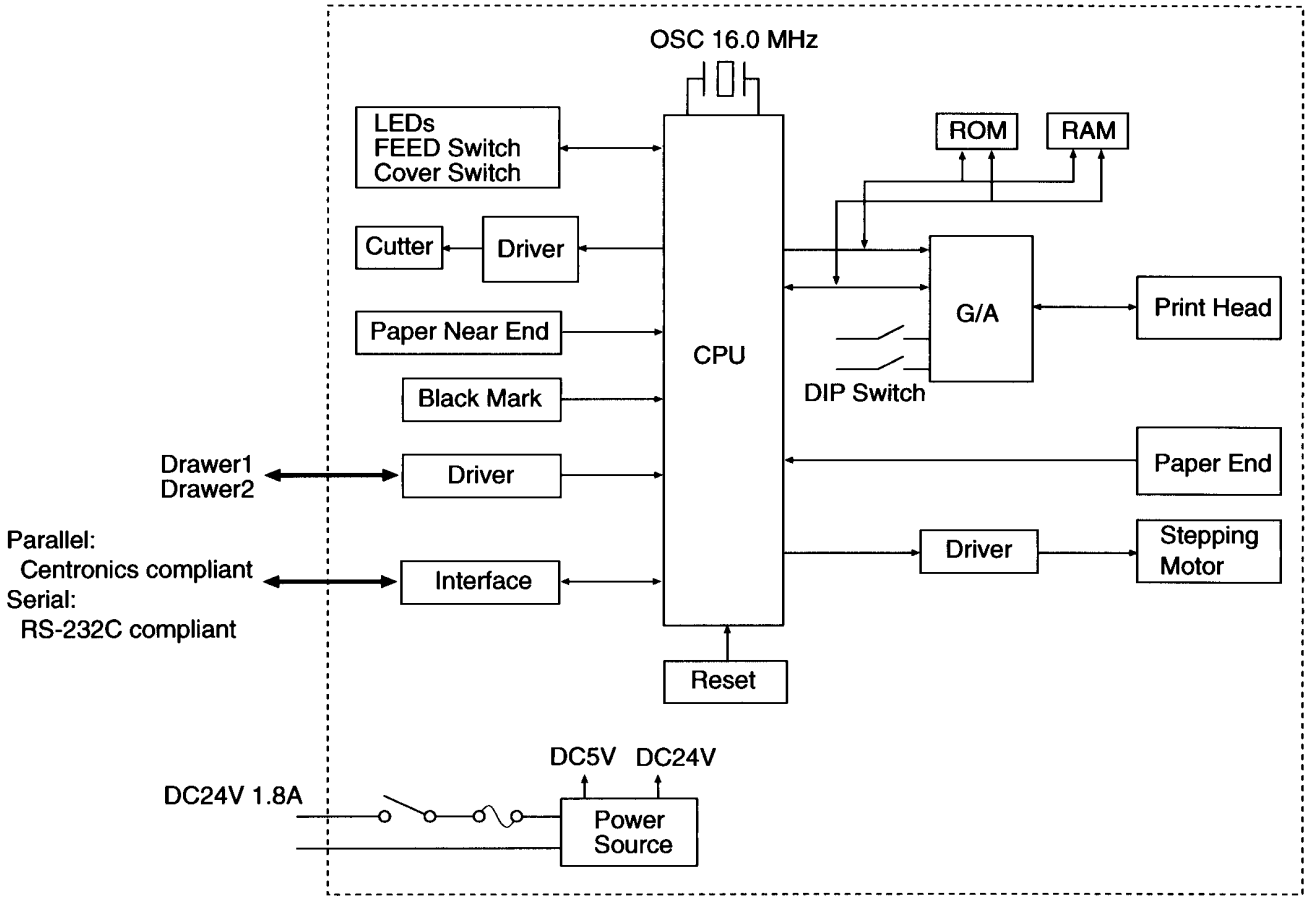
Because the status sent from the printer has certain fixed bits, it is possible to identify to which command the status belongs.

When using ASB (Automatic Status Back), however, the first byte of ASB should be checked, and then the three consecutive bytes except for XOFF should be treated as ASB data.

Identification of Send Status

Command and function	Status
GS I	<0**0****>B
GS r	<0**0****>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0**1**10>B
ASB (1st byte)	<0**1**00>B
ASB (2nd - 4th bytes)	<0**0****>B

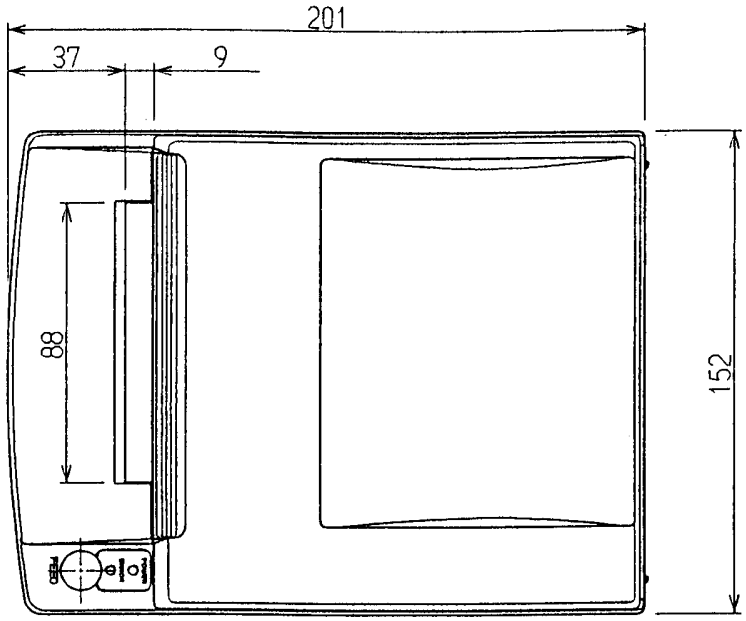
APPENDIX 4. BLOCK DIAGRAM



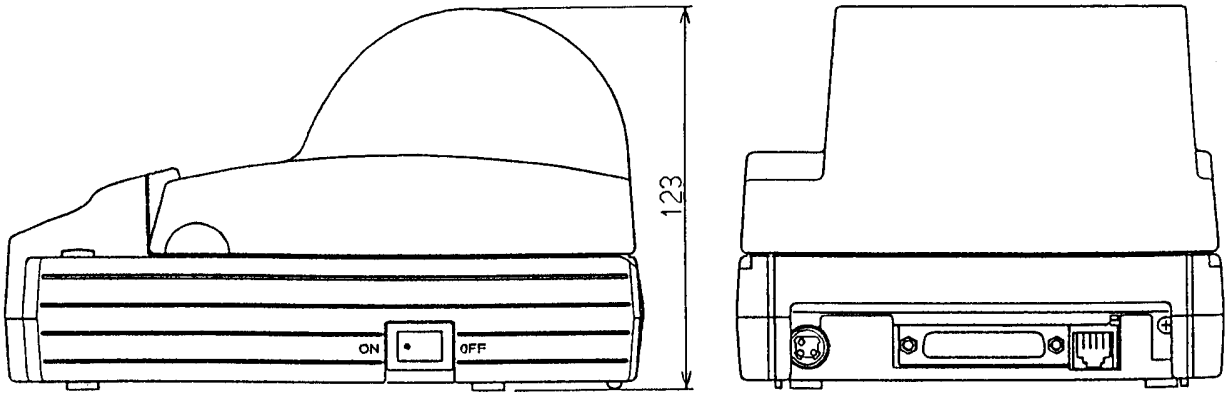
*1 Parallel Interface --- Centronics compliant
Serial Interface --- RS-232C compliant

APPENDIX 5. OUTLINE DRAWING

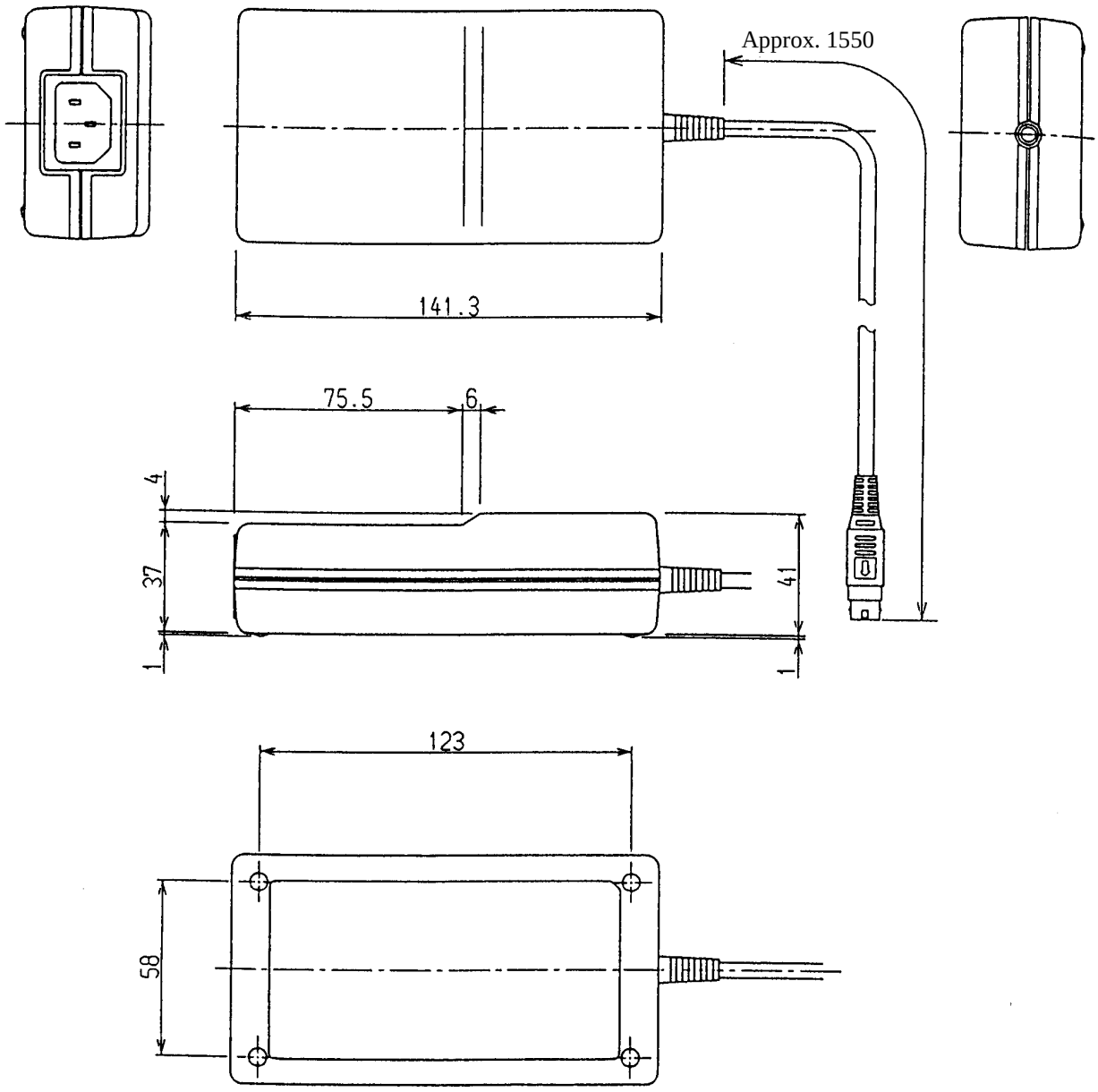
iDP3220



Unit : mm



AC Adapter (30AD)



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<VORSICHT>

1. Bitte lesen Sie die Bedienungsanleitung vor dem Betrieb des Geräts aufmerksam durch und bewahren Sie die Anleitung anschließend für späteres Nachschlagen an einem sicheren Platz auf.
2. Änderungen des Inhalts dieser Anleitung bleiben ohne Vorankündigung vorbehalten.
3. Die Vervielfältigung dieser Bedienungsanleitung ohne vorherige Genehmigung verstößt, auch auszugsweise, gegen das Urheberschutzrecht.
4. Niemals versuchen, in dieser Anleitung nicht erwähnte Geräteteile eigenhändig zu warten, zerlegen oder zu reparieren.
5. Bitte beachten Sie, daß wir keinerlei Haftung für Schäden übernehmen, die auf unsächgemäße Bedienung, falsche Handhabung oder eine ungeeignete Betriebsumgebung zurückzuführen sind.
6. Zur Vermeidung von Unfällen und sonstigen Problemen ist das Gerät ausschließlich auf die in der Bedienungsanleitung beschriebene Weise zu betreiben.
7. Daten sind grundsätzlich temporär, d.h. sie können nicht permanent gesichert oder über längere Zeit gespeichert werden. Es sei deshalb darauf hingewiesen, daß wir für finanzielle Schäden oder Profitrückgänge als Folge von Datenverlust, Unfällen, Reparaturen, Tests usw. keinerlei Haftung übernehmen.
8. Bitte wenden Sie sich mit Fragen oder Hinweisen auf Fehler oder Auslassungen im Text dieser Anleitung an unsere Geschäftsstelle.
9. Beachten Sie jedoch, daß wir, ungeachtet des obigen Punkts 8, keinerlei Haftung für negative Folgeerscheinungen im Zusammenhang mit dem Betrieb dieses Geräts übernehmen.

ZU BEACHTENDE SICHERHEITSMASSREGELN

Zur Vermeidung von Gefahren gegenüber dem Bediener und anderen Personen und Sachschäden sind die folgenden Vorsichtsmaßregeln unbedingt zu beachten.

- Der folgende Text beschreibt das Ausmaß der Gefahren und potentiellen Sachschäden, die durch eine Mißachtung der Bedienungshinweise oder durch die unsachgemäße Handhabung des Geräts entstehen können.

⚠ **WARNUNG**	Die Mißachtung dieser Vorsichtsmaßregel kann zu Körperverletzungen mit möglicher Todesfolge führen.
⚠ **VORSICHT**	Die Mißachtung dieser Vorsichtsmaßregel kann zu Körperverletzungen oder Sachschäden führen.

⚠ Dieses Symbol ruft den Bediener zu erhöhter Wachsamkeit auf.

ⓘ Dieses Symbol weist auf wichtige Informationen, wie z.B. Bedienungsschritte oder dergleichen, hin.

⚠ WARNUNG

- Beim Betrieb des Geräts sind die nachfolgenden Vorsichtsmaßregeln unbedingt zu beachten. Eine Mißachtung dieser Hinweise kann zu Schäden, Funktionsstörungen, Rauchentwicklung und Brandgefahr durch Überhitzen und zu elektrischen Schlägen führen.
  Der fortgesetzte Betrieb des Geräts in anormalem Zustand, wie z.B. nach einer Beschädigung, kann Funktionsstörungen, Rauchentwicklung, fremde Gerüche/Geräusche und Brände verursachen. Wenn anormale Erscheinungen beim Betrieb auftreten, sofort das Gerät stoppen, den Netzstecker abziehen, und den Fachhändler benachrichtigen. Niemals versuchen, das Gerät eigenhändig zu reparieren, um ernsthafte Gefahren zu vermeiden.
- Das Gerät vor starken Stößen und Erschütterungen, wie z.B. Tritte, Stampfen, Schläge, Herunterfallen usw., schützen.
- Das Gerät an einem gut belüfteten Platz aufstellen, und darauf achten, die Belüftungsöffnung nicht zu blockieren.
- Bei der Aufstellung des Geräts Plätze vermeiden, an denen chemische Reaktionen auftreten, wie z.B. in einem Labor, sowie Plätze mit salz- oder gashaltiger Umgebungsluft.
- Netz- und Datenkabel niemals am Kabel haltend anschließen oder abziehen. Bei Betrieb, Verrücken oder Tragen des Geräts darauf achten, daß die Kabel keiner Gewalteinwirkung ausgesetzt sind.
- Darauf achten, daß keine Fremdköper, wie z.B. Nadeln oder Büroklammern, in das Gerät gelangen.
- Darauf achten, keine Flüssigkeiten auf dem Gerät zu vergießen oder chemische Substanzen enthaltende Sprays darüber zu versprühen. Bei versehentlichem Naßwerden das Gerät sofort ausschalten, das Stromanschlußkabel abziehen, das Netzkabel von der Steckdose trennen usw. und an einen Fachhändler wenden.
- Nicht dieses Gerät zerlegen oder modifizieren. Eine Mißachtung dieser Vorsichtsmaßregel kann zu Bränden und elektrischen Schlägen führen.
- Das Gerät nur mit der vorgeschriebenen Netzspannung und dem vorgeschriebenen Netzteil verwenden. Eine Mißachtung dieser Vorsichtsmaßregel kann Brände, elektrische Schläge und Funktionsstörungen verursachen.
- Wenn das Netzteil herunterfällt, beschädigt wird oder naß wird, sofort von der Steckdose trennen und sich an einen Fachhändler wenden.
- Das Netzkabel nicht beschädigen, brechen, modifizieren, mit Gewalt biegen/ziehen, verdrehen oder kurzschließen. Ein beschädigtes Netzteil kann Brände, elektrische Schläge und Funktionsstörungen verursachen. Wenden Sie sich bei einer Beschädigung des Netzteilkabels bitte an unsere Kundendienstvertretung.
- Wenden Sie sich bei einer Beschädigung des Netzteilkabels bitte an unsere Kundendienstvertretung.
- Das Netzteil niemals mit nassen Händen anschließen oder trennen. Hierdurch können Brände, elektrische Schläge und sonstige Probleme entstehen.
- Verpackungsbeutel sind vorschriftsgemäß zu entsorgen oder ansonsten von Kindern fernzuhalten. Kleinkinder können durch Überstreifen eines Plastikbeutels ersticken.

⚠ VORSICHTSMASSREGELN FÜR DIE AUFSTELLUNG

- Das Gerät nicht an Plätzen abstellen oder betreiben, an denen es Feuer, Feuchtigkeit oder direkter Sonnenbestrahlung ausgesetzt ist. Ebenso sind Plätze in der Nähe von Heizkörpern und sonstigen Wärmenquellen zu vermeiden, an denen Umgebungstemperatur und Luftfeuchtigkeit nicht den vorgeschriebenen Betriebsbedingungen entsprechen, sowie Plätze, an denen das Gerät Öl, Metallspänen oder Staub ausgesetzt ist. Andernfalls können Funktionsstörungen sowie Rauch- und Brandentwicklung die Folge sein.
- Bei der Aufstellung des Geräts Plätze vermeiden, an denen chemische Reaktionen auftreten, wie z.B. in einem Labor, sowie Plätze mit salz- oder gashaltiger Umgebungsluft. Hierbei besteht die Gefahr von Bränden und elektrischen Schlägen.
- Den Drucker auf einer ebenen, stabilen Tischplatte an einem gut belüfteten Platz und frei von Erschütterungen aufstellen.
- Keine Gegenstände auf den Drucker stellen und keine kleinen Gegenstände wie Papierclips oder Stifte in der Nähe liegen lassen. Diese können Betriebsstörungen verursachen, wenn sie in das Gerät gelangen.
- Das Gerät nicht in der Nähe eines Radios oder Fernsehers verwenden und nicht zusammen mit einem Radio oder Fernseher an die gleiche Steckdose anschließen. Hierdurch können Empfangsstörungen auftreten.
- Das Gerät ausschließlich mit der vorgeschriebenen Netzspannung und -frequenz betreiben. Eine Mißachtung dieser Vorsichtsmaßregel kann Brände, elektrische Schläge und Funktionsstörungen verursachen.
- Das Gerät ausschließlich mit der vorgeschriebenen Netzspannung betreiben. Eine Mißachtung dieser Vorsichtsmaßregel kann Brände, elektrische Schläge und Funktionsstörungen verursachen.
- Vergewissern, daß die für den Anschluß des Netzkabels verwendete Steckdose über eine ausreichende Kapazität verfügt.
- Das Gerät nicht zusammen mit anderen Geräten an die gleiche Steckdose anschließen oder lange Verlängerungskabel verwenden. Andernfalls können Brände und Stromausfälle die Folge sein. Nicht auf das Netzkabel treten, schwere Gegenstände darauf abstellen, das Netzkabel anderweitig belasten (ziehen, quetschen) oder den Drucker mit einem derartig belasteten Netzkabel betreiben.
- Erdungskabel niemals an ein Gasrohr anschließen, da hierbei Explosionsgefahr besteht. Vor dem Anschließen oder Trennen eines Erdungskabels unbedingt zuerst den Netzstecker aus der Steckdose ziehen.
- Beim Anschließen oder Trennen der Kabel zuerst die Netzversorgung ausschalten, einschließlich der angeschlossenen Seite, und dann an Stecker und Steckdose haltend anschließen bzw. trennen. Durch ziehen am Kabel selber kann dieses reißen oder anderweitig beschädigt werden.
- Netzkabel oder Verbindungskabel immer fest anschließen. Durch Anschluß mit umgekehrter Polarität können Innenbauteile oder Paßflächen beschädigt werden.
- Für Datensignalleitungen abgeschirmte Kabel oder verzwirbelte Doppeladerkabel verwenden, um Rauschstörungen möglichst gering zu halten. Das Kabel nicht über zu lange Strecken verlegen oder an gestörte Geräte anschließen. Durch Anschluß an gestörte Geräte kann fehlerhafter Druck aufgrund von korruptierten Daten usw. verursacht werden.
- Falls ein Geldschubladen-Ausschubmechanismusstecker vorhanden ist, sollten keine anderen Vorrichtungen, die nicht den vorgeschriebenen Solenoidspezifikationen entsprechen, angeschlossen werden. Eine Mißachtung dieser Vorsichtsmaßregel kann zu Fehlfunktionen führen.
- Das Gerät an einem Platz in der Nähe einer Steckdose betreiben, wo sich der Netzstecker zum Unterbrechen der Stromversorgung jederzeit schnell und mühelos abziehen läßt.
- Wenn das Gerät längere Zeit lang nicht benutzt wird, den Stecker abziehen und die Papierrolle herausnehmen.
- Beim Transport des Geräts die Papierrolle aus dem Papierhalter nehmen.

⚠ VORSICHTSMASSREGELN FÜR DIE HANDHABUNG

Zur Vermeidung von Problemen sind bei der Handhabung des Geräts die folgenden Vorsichtsmaßregeln zu beachten.

- Keine andere Betriebsstromquelle als das mitgelieferte Netzteil verwenden. Das Netzteil nicht für andere Zwecke verwenden.
- Nicht ohne eingelegte Papier drucken.
- Keine Fremdkörper wie Papierclips, Sicherheitsnadeln etc. in den Drucker fallenlassen.
- Darauf achten, keine Flüssigkeiten auf dem Gerät zu vergießen oder chemische Substanzen enthaltende Sprays darüber zu versprühen.
- Das Gerät vor starken Stößen und Erschütterungen bewahren und nicht fallen lassen.
- Niemals mit spitzen Objekten, wie z.B. einem Kugelschreiber, auf das Bedienfeld drücken.
- Papierblätter niemals zum fortlaufenden Drucken mit Klebestreifen zusammenkleben. Dadurch kann der Druckkopf beschädigt werden.
- Ein bereits eingezogenes Blatt niemals gewaltsam herausziehen.

Zur Vermeidung vonVerletzungen und Schäden

- Den druckenden Abschnitt des Druckkopfes nicht berühren.
- Bei Einschalten keine beweglichen Teile, wie z.B. Schneidklinge und Zahnrad im Druckergehäuse, oder elektrische Teile berühren.
- Darauf achten, körperliche Verletzungen und die Beschädigung anderer Objekte durch scharfe Kanten zu vermeiden.
- Bei Auftreten jeglicher Störungen während des Betriebs den Drucker sofort ausschalten, und das Netzkabel aus der Steckdose ziehen.
- Die Beseitigung von Betriebsstörungen ist qualifiziertem Fachpersonal zu überlassen. Niemals versuchen, das Gerät eigenhändig zu zerlegen.

ⓘ TÄGLICHE WARTUNG

- Bei der Wartung immer den Netzschalter des Druckers auf Aus stellen und den Stecker aus der Steckdose ziehen.
- Zur Reinigung der Walze Verschmutzungen mit einem Wattestäbchen entfernen, das mit etwas Äthyalkohol benetzt ist.
- Schmutz und Staub mit einem trockenen, weichen Tuch vom Druckergehäuse abwischen. Bei starker Verschmutzung einen Lappen in Wasser anfeuchten, auswringen und damit abwischen. Hierzu niemals flüchtige organische Lösungsmittel, wie z.B. Alkohol, Terpentin, Trichlorethan, Benzol, Keton oder chemische Staubentfernungsmittel, verwenden.
- Papierstaub mit einer weichen Bürste vom Gehäuse entfernen. Darauf achten, nicht den Druckkopf zu beschädigen.

⚠ VORSICHT:

Druckkopf und Motor werden sehr heiß. Diese Teile nicht sofort nach dem Drucken berühren.

- Reinigen des Druckkopfes
  1. Die Druckwalzeneinheit unter Beachtung der Anweisungen in "4.6 Beseitigen von Papierstau" entfernen.
  2. Den Staub von der Oberfläche der Heizeinheit mit einem mit Äthylalkohol getränkten Wattetupfer abwischen.
  3. Die Druckwalzeneinheit wieder anbringen.

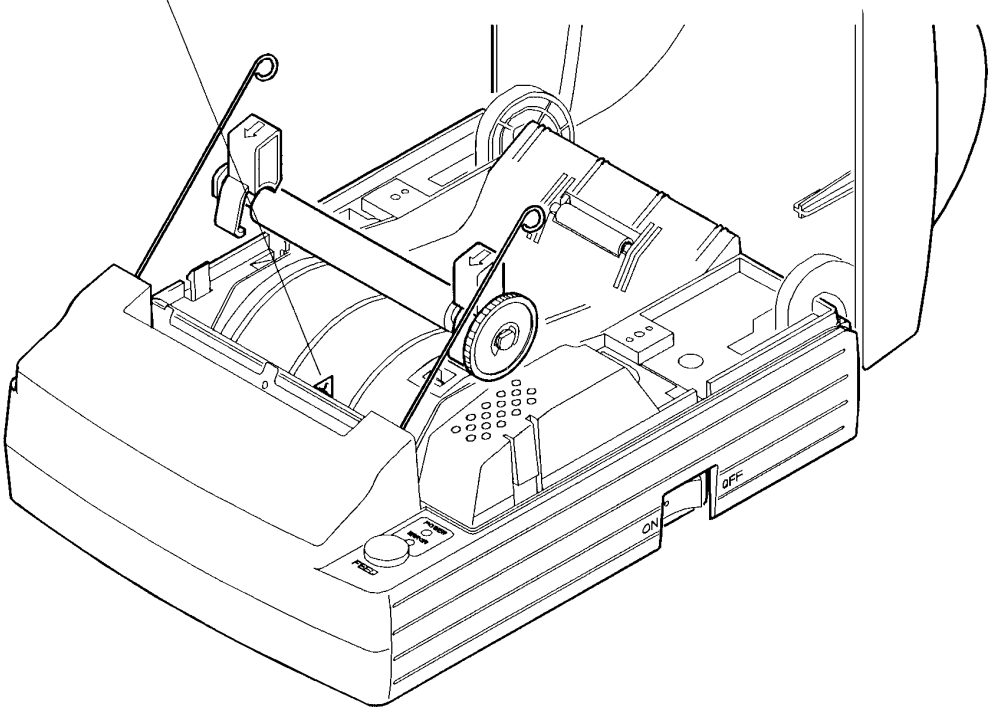
⚠ VORSICHT:

Die Wartung nicht direkt nach dem Drucken ausführen, da Druckkopf und Motor sich beim Betrieb stark erhitzen.

Nicht die Oberfläche der Heizeinheit des Druckkopfes mit der bloßen Hand oder mit Metallgegenständen berühren.

An der im folgenden abgebildeten Stelle ist ein Warnaufkleber angebracht. Die zum korrekten Betrieb des Geräts zu beachtenden Sicherheitshinweise sorgfältig lesen.

Dieser Aufkleber warnt davor, daß der Kopf während des Betriebs sehr heiß wird und seine Berührung zu Verbrennungen führen kann.



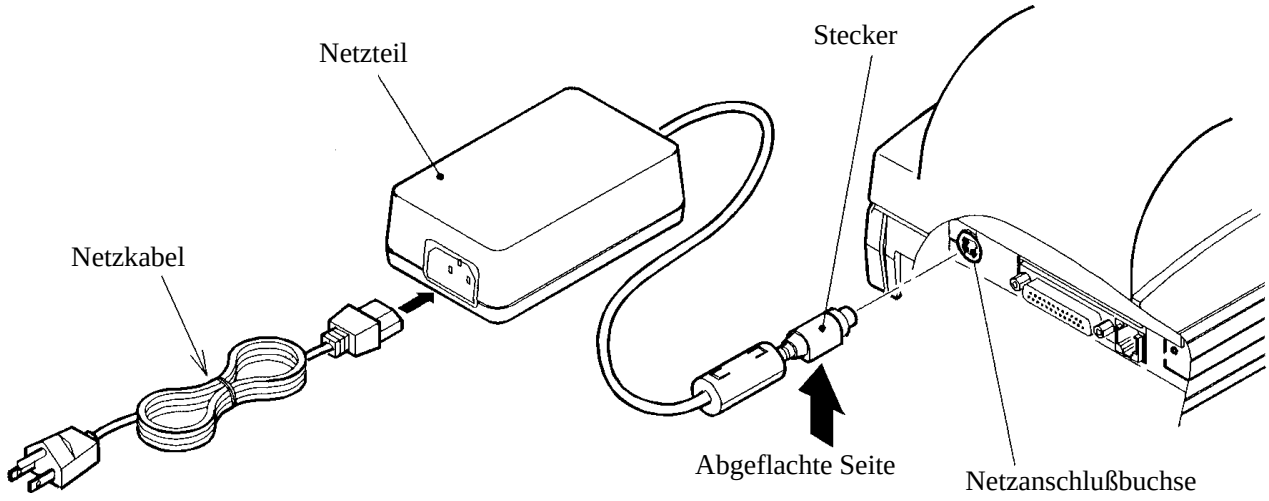
4. BETRIEB

4.1 Anschließen des Netzteils

1. Das Gerät ausschalten.
2. Den Netzkabelstecker mit der abgeflachten Seite nach unten in die Buchse an der Rückseite des Druckers stecken.
3. Das Netzkabel des Netzteils zwischen Netzteil und Netzstecker anschließen.

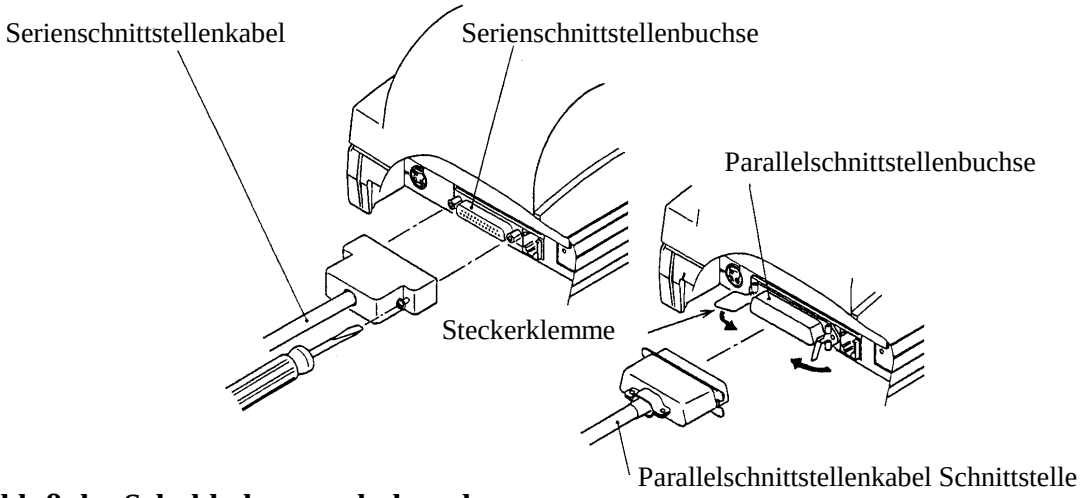
⚠ VORSICHT:

- Nur das vorgeschriebene Netzteil verwenden.
- Beim Anschließen/Abtrennen des Steckers vom Netzteil immer am Stecker und nicht am Kabel anfassen.
- Das Netzteil von anderen rauscherzeugenden Geräten getrennt anschließen.
- Durch starkes Ziehen am Netzkabel dann dieses beschädigt werden, was zu Bränden, elektrischen Schlägen oder Reißen führen kann.
- Bei Gewitter das Netzteil vom Netz trennen und nicht den Drucker betreiben, da sonst die Gefahr von Bränden oder elektrischen Schlägen besteht.
- Das Netzkabel nicht in der Nähe von Heizkabeln verlegen. Die Ummantelung könnte schmelzen und zu Bränden oder elektrischen Schlägen führen.
- Nach der Verwendung des Druckers oder wenn das Gerät längere Zeit über nicht verwendet werden soll immer aus Sicherheitsgründen, Netzstecker abziehen.



4.2 Anschließen des Schnittstellenkabels

1. Das Gerät ausschalten. (Paßseite eingeschlossen)
2. Die Ober- und Unterseite der Kabelkontakte prüfen, und an den Schnittstellenkontakt anschließen.
3. Die Kabelkontakte befestigen. Serielle Schnittstelle: Die Schrauben zum Befestigen festziehen. Parallelschnittstelle: Einen Befestigungsring zum Befestigen in Pfeilrichtung drehen.
4. Das Kabel an den Hostcomputer anschließen.

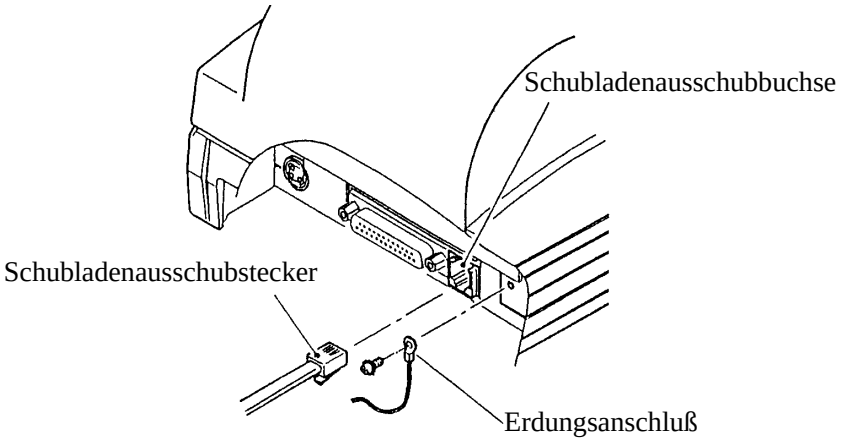


4.3 Anschluß des Schubladenausschubsteckers

1. Das Gerät ausschalten.
2. Prüfen Sie die Ober- und Unterseite des Anschlusses für den Schubladenausschubstecker und schließen Sie ihn an den Anschluß des Schubladenausschubsteckers am unteren Teil des Druckers an.
3. Schrauben Sie das Erdungskabel der Schublade an den Erdungsanschluß an, den Sie am unteren Teil des Druckers sehen.

⚠ VORSICHT :

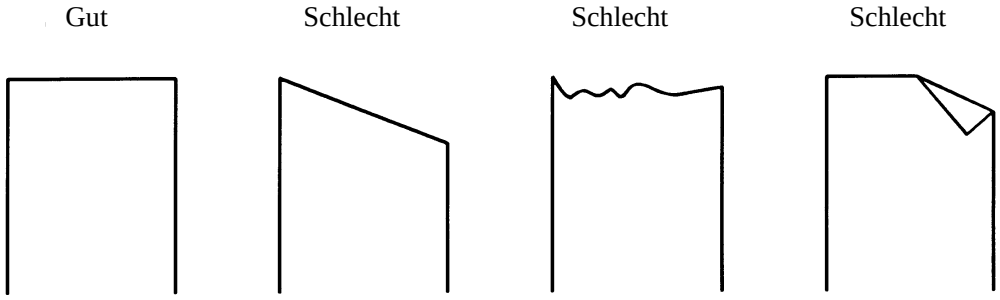
- Nur den vorgeschriebenen Lade-(Magneten) an den Laden-Auszugstecker anschließen. (Nicht an eine Telefonleitung anschließen.)



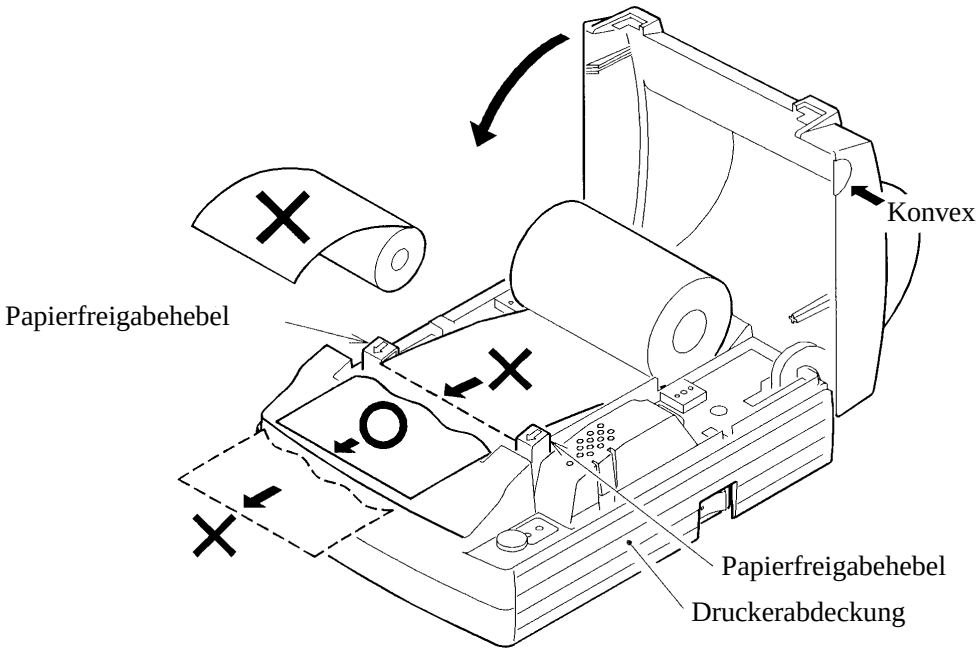
4.4 Einlegen des Papiers

4.4.1 Einlegen des Papiers

1. Gerät einschalten.
2. Mit den Fingern in die Aussparungen der Druckerabdeckung greifen und die Abdeckung bis zum Anschlag öffnen.
3. Das Ende der Papierrolle im rechten Winkel abschneiden.



4. Sicherstellen, daß die Papierrolle mit der richtigen Seite nach oben in den Papierhalter in der Druckerabdeckung eingelegt ist.
5. Überprüfen, daß sich die Papierrolle zwischen den Papierfreigabehebeln befindet, das Papierrollenende bis an die Kante der Druckerabdeckung ziehen und die Druckerabdeckung schließen. Das Papier wird automatisch eingezogen und tritt am Papierauslauf des Druckers aus.
6. Überschüssiges Papier an der Papierabreißkante am Papierauslauf des automatischen Schneidemechanismus abreißen.



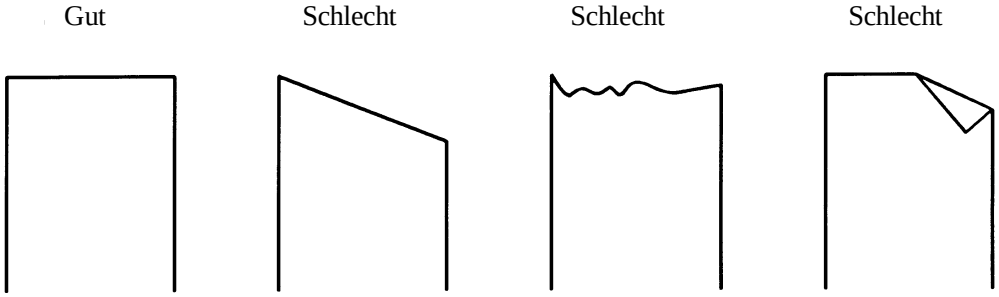
⚠ VORSICHT:

- Ausschließlich die vorgeschriebene Papiersorte verwenden.
- Die Verwendung anderer Papiersorten kann zu verminderter Druckqualität, verkürzter Betriebslebensdauer des Druckers u. dergl. führen.
- Die Druckerabdeckung ist nicht abnehmbar und sollte deshalb nicht über den Anschlag hinaus geöffnet werden.
- Das in den Drucker einzuführende Papierende darf nicht geknickt oder eingerissen sein.
- Das Papierrollenende immer bis an die Kante der Druckerabdeckung ziehen. Darauf achten, daß das Papier nicht weit über die Kante hinausragt oder sie nicht erreicht.
- Nach dem Einlegen der Papierrolle wird das Papierende möglicherweise gefaltet oder geknickt aus dem Papierauslauf herausgeführt. Wenn das Papier nicht am Papierauslauf erscheint, das Papierende prüfen und nochmals einlegen.
- Bei schräg eingelegter Papierrolle den Papierfreigabehebel nach vorn schieben und das Papier ausrichten.
- Die Druckerabdeckung nicht während des Druckvorgangs öffnen.
- Wenn die Papierrolle während des Druckvorgangs gehalten oder berührt wird, führt dies möglicherweise zu einem Papierstau.
- Wenn der automatische Schneidemechanismus zum vollständigen Abschneiden des Papiers verwendet wird, das abgeschnittene Papier vor dem nächsten Druckvorgang entfernen, um einen Stau zu vermeiden.

4.4.2 Papier manuell einlegen

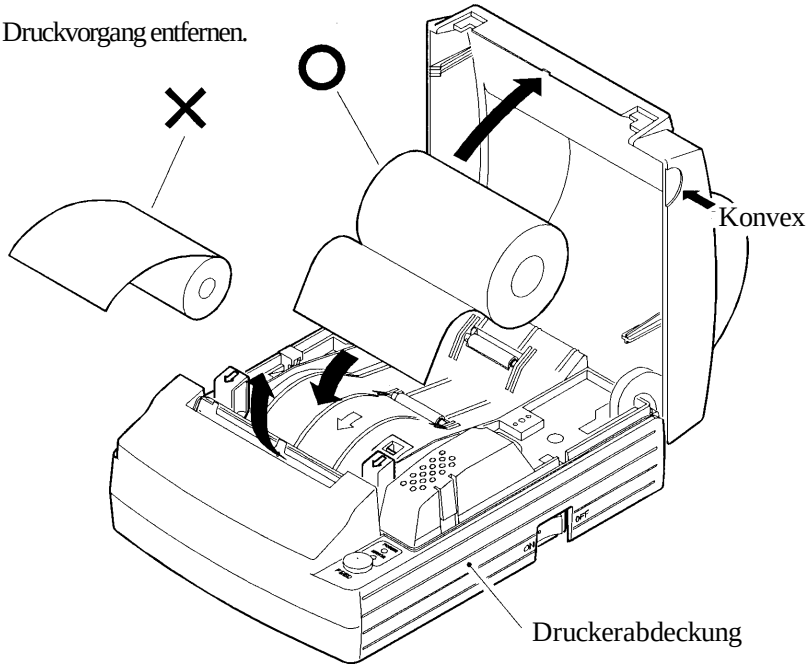
Papier kann manuell eingelegt werden, wenn der DIP-Schalter DS1-2 auf ON gestellt ist, um die Erkennung der Stellung der Druckerabdeckung zu deaktivieren.

1. Gerät einschalten.
2. Mit den Fingern in die Aussparungen der Druckerabdeckung greifen und die Abdeckung bis zum Anschlag öffnen.
3. Das Ende der Papierrolle im rechten Winkel abschneiden.



4. Sicherstellen, daß die Papierrolle mit der richtigen Seite nach oben in den Papierhalter in der Druckerabdeckung eingelegt ist.
5. Das Papierrollenende gerade zwischen Druckwalze und Druckkopf einführen.
6. Das Papier wird automatisch von der Druckwalze eingezogen und in den automatischen Schneidemechanismus eingeführt (und ragt ein wenig aus dem Papierauslauf des automatischen Schneidemechanismus heraus).
7. Wenn die Druckerabdeckung geschlossen ist, wird das Papier einige Zeilen weiter transportiert, so daß Schneiden und Drucken möglich ist.

   Abgeschnittenes Papier vor dem Druckvorgang entfernen.



⚠ VORSICHT:

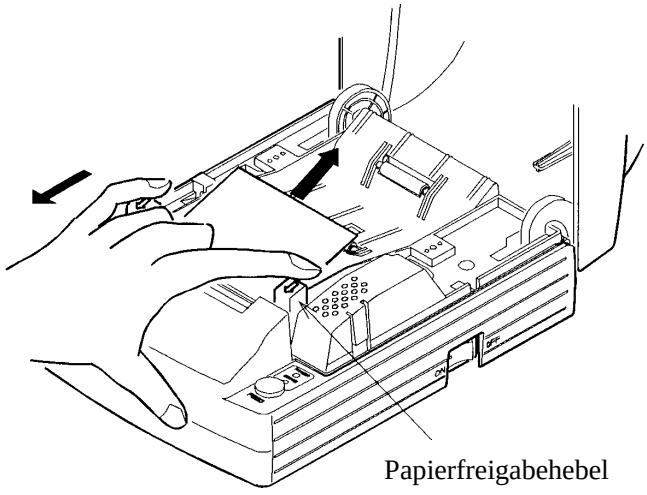
- Ausschließlich die vorgeschriebene Papiersorte verwenden.
- Die Verwendung anderer Papiersorten kann zu verminderter Druckqualität, verkürzter Betriebslebensdauer des Druckers u. dergl. führen.
- Die Druckerabdeckung ist nicht abnehmbar und sollte deshalb nicht über den Anschlag hinaus geöffnet werden.
- Das in den Drucker einzuführende Papierende darf nicht geknickt oder eingerissen sein.
- Lockeres Papier straffwickeln. Wenn das Papier zu locker auf der Papierrolle aufgewickelt ist, führt der Drucker die in 6. und 7. in 4.4.2 "Papier manuell einlegen" beschriebenen Arbeitsschritte durch, da der Abstand von der Papierrolle zum Papiersensor zu groß ist.
- Nach dem Einlegen der Papierrolle wird das Papierende möglicherweise gefaltet oder geknickt aus dem Papierauslauf herausgeführt. Wenn das Papier nicht am Papierauslauf erscheint, das Papierende prüfen und nochmals einlegen.
- Bei schräg eingelegter Papierrolle den Papierfreigabehebel nach vorn schieben und das Papier ausrichten.
- Die Druckerabdeckung nicht während des Druckvorgangs öffnen.
- Wenn die Papierrolle während des Druckvorgangs gehalten oder berührt wird, führt dies möglicherweise zu einem Papierstau.
- Wenn der automatische Schneidemechanismus zum vollständigen Abschneiden des Papiers verwendet wird, das abgeschnittene Papier vor dem nächsten Druckvorgang entfernen, um einen Stau zu vermeiden.

4.5 Herausnehmen der Restpapierrolle

1. Die Druckerabdeckung öffnen.
2. Beide Papierfreigabehebel in Pfeilrichtung stellen. Die Druckwalze wird dann vom Druckkopf abgehoben, und das Papier kann entfernt werden.

⚠ VORSICHT:

- Beim Herausziehen des Papiers (in Vorwärts- oder Rückwärtsrichtung) den Papierfreigabehebel in Pfeilrichtung stellen.



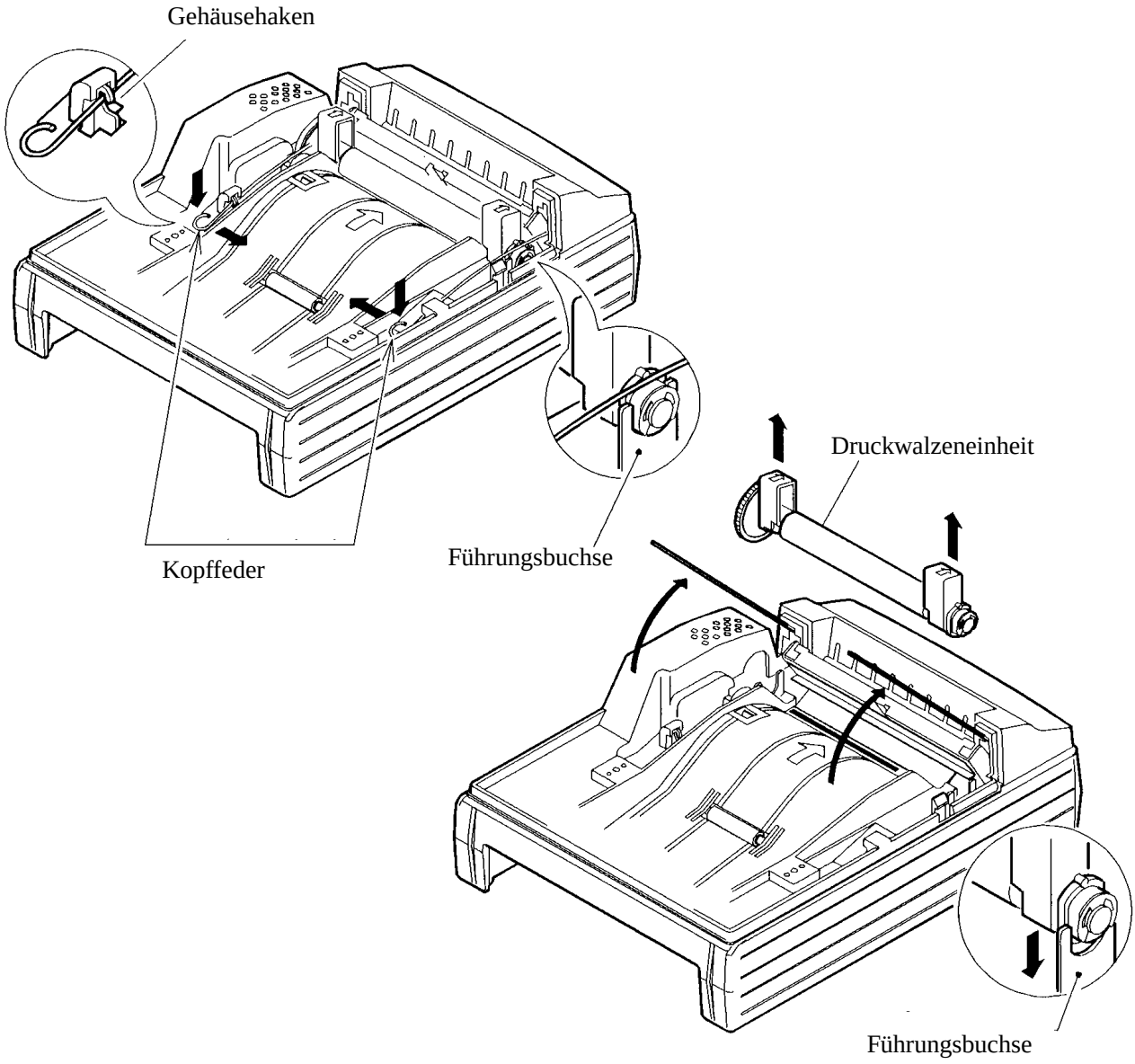
Papierfreigabehebel

4.6 Beseitigen von Papierstau

1. Das Gerät ausschalten.
2. Die Druckerabdeckung öffnen.
3. Die Papierrolle in der Nähe des Papiereinzugschachts abschneiden.
4. Die Kopffedern auf beiden Seiten in Pfeilrichtung bewegen, um sie aus den Gehäusehaken auszuhaken; dann anheben.
5. Die Druckwalzeneinheit durch Anheben beider Papierfreigabehebel entfernen.
6. Die restlichen Papierrolle vollständig aus dem Papierpfad entfernen.
7. Die Ausrichtung der Druckwalzeneinheit prüfen und diese so installieren, daß sie korrekt in die Führungsbuchse am Gehäuse eingreift, wie in der Abbildung gezeigt.
8. Die Hebeleinheit leicht andrücken und die Kopffedern in die Haken einhaken.

⚠ VORSICHT:

- Diese Arbeit nicht sofort nach dem Drucken ausführen, da sich der Druckkopf stark erhitzt.
- Kopffedern nicht überdehnen.
- Beim Entfernen von verbleibendem Papier nicht die Heizoberfläche des Kopfes mit bloßen Händen oder Metallgegenständen berühren.
- Beim Wiedereinsetzen der Druckwalzeneinheit immer bestätigen, daß sie korrekt angebracht ist.
- Vor dem Entfernen der Druckwalzeneinheit das Gerät immer ausschalten.

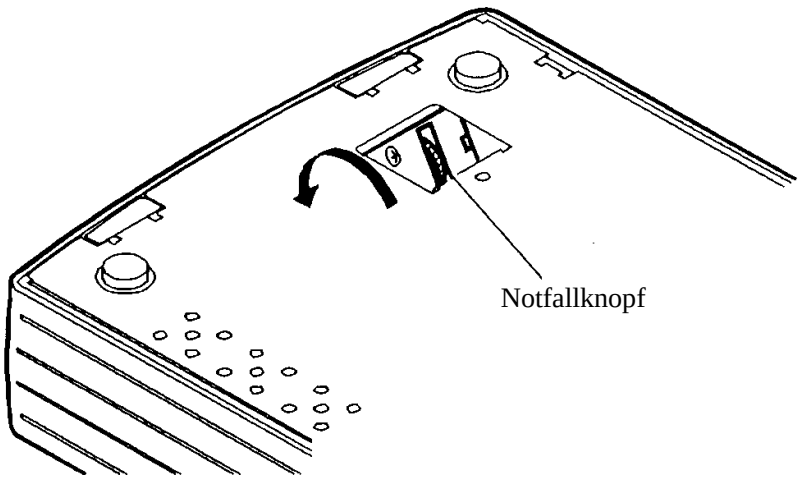

Gehäusehaken
Kopffeder
Führungsbuchse
Druckwalzeneinheit
Führungsbuchse

4.7 Initialisierung des Schneidemechanismus

5. Papier aus dem Papierweg entfernen wie im Abschnitt "4.6 Beseitigen von Papierstaus" beschrieben.
6. Gerät einschalten. Die Initialisierung des automatischen Schneidemechanismus beginnt, dieser fährt in seine Ausgangsstellung, worauf dann der Alarm gelöscht wird
7. Wenn der automatische Schneidemechanismus nach Einschalten des Geräts nicht in seine Ausgangsstellung fährt, wie im folgenden beschrieben vorgehen: Gerät ausschalten. Die Schneidklinge des automatischen Schneidemechanismus in ihre Ausgangsstellung fahren, indem der Notfallknopf am Boden des automatischen Schneidemechanismus in Pfeilrichtung gedreht wird; dazu eine Pinzette, einen Schraubendreher o. dergl. verwenden.
8. Eventuell im Bereich der Schneideklinge verbliebenes Papier mit einer Pinzette oder ähnlichem vollständig entfernen.

⚠ VORSICHT:

- Diese Arbeit nicht sofort nach dem Drucken ausführen, da sich der Druckkopf stark erhitzt.
- Beim Entfernen von verbleibendem Papier nicht die Heizoberfläche des Kopfes mit bloßen Händen oder Metallgegenständen berühren.
- Der automatische Schneidemechanismus wird mit dem DIP-Schalter aktiviert und deaktiviert. Wenn der Drucker mit deaktiviertem automatischen Schneidemechanismus verwendet wird, sicherstellen, daß der automatische Schneidemechanismus in der Ausgangsstellung steht. Wenn dies nicht der Fall ist, muß er durch Drehen des Notfallknopfs an der Unterseite des Druckers in Pfeilrichtung in die Ausgangsstellung gebracht werden.

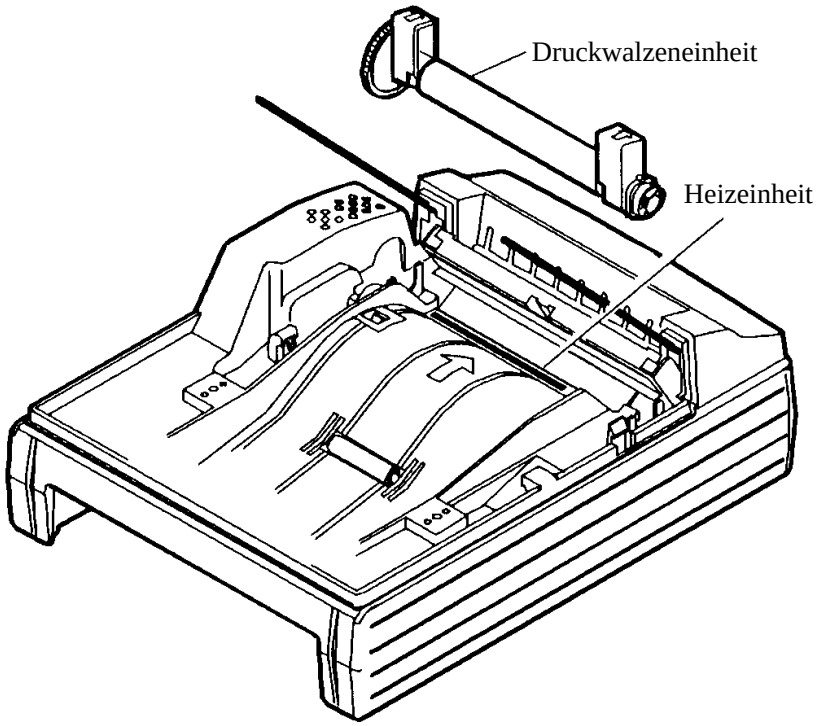


4.8 Kopf reinigen

1. Druckwalzeneinheit entfernen wie in 4.6 "Beseitigen von Papierstaus" beschrieben.
2. Heizfläche des Kopfs mit einem Wattestäbchen reinigen, das mit etwas Äthyalkohol benetzt ist.
3. Druckwalzeneinheit einbauen.

⚠ VORSICHT:

- Nicht die Oberfläche der Heizeinheit des Druckkopfes mit der bloßen Hand oder mit Metallgegenständen berühren.
- Diese Arbeit nicht sofort nach dem Drucken ausführen, da sich der Druckkopf stark erhitzt.
- Vor dem Entfernen der Druckwalzeneinheit das Gerät immer ausschalten.



4.9 Bedienfeld und Fehleranzeigen

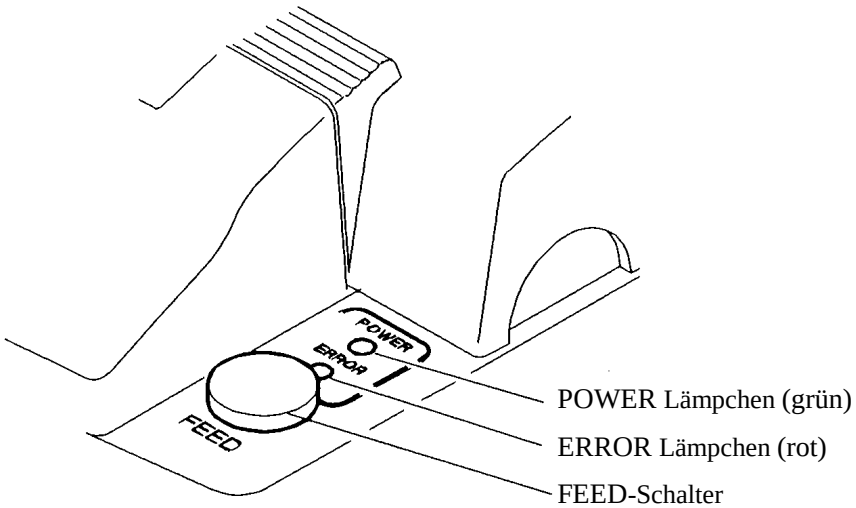
1. POWER-Lämpchen (grün)

   Leuchtet beim Einschalten auf. Blinkt auch zur Anzeige eines Speicherfehlers

2. ERROR-Lämpchen (rot)

   Zeigen durch Leuchten oder Blinken einen Fehler an.

Fehler	PAPER-Lämpchen	ERROR-Lämpchen	Rückstellen
Speicherprüfung-Fehler	Schnelles Blinken	EIN	Kann nicht rückgestellt werden
Abdeckung geöffnet	EIN	EIN	Druckerabdeckung schließen.
Kopfüberhitzung	EIN		natische Rückstellung durch Temperaturabfall
Papiervorrat fast leer	EIN	EIN	Nach Druckstopp eine neue Papierrolle einsetzen.
Papierende	EIN	EIN	Eine neue Papierrolle einsetzen
Schneidemechanismus-Motorsperre	EIN	Schnelles + Langsames Blinken	Den Papierstau beseitigen.
Warten auf Makroausführung	EIN	Langsames Blinken	Den FEED-Schalter drücken



< Fehler-Einzelheiten >

Abdeckung geöffnet ---- Der Öffnungssensor der Druckerabdeckung hat erkannt, daß die Druckerabdeckung geöffnet ist. In diesem Fall leuchtet das ERROR-Lämpchen, und der Druckvorgang ist gestoppt. Es ist zu beachten, daß der DIP-Schalter so eingestellt werden kann, daß das Papier auch bei geöffneter Druckerabdeckung vorgeschoben wird.

Kopfüberhitzen ----- Wenn die Temperatur des Druckkopfes ansteigt (auf 65°C oder mehr) wird ein Druckkopftemperatur-Sensor zum Stoppen des Druckens aktiviert, um den Kopf vor Überhitzung zu schützen. Wenn die Temperatur absinkt (auf ca. 60°C) wird der Druck automatisch fortgesetzt.

Papiervorrat fast leer -----Wenn die Papierrolle einen bestimmten Durchmesser erreicht, wird das ERROR-Lämpchen vom Papierrestsensor aktiviert; dieser befindet sich auf der Rollenseite der oberen Abdeckung. (Siehe Funktion der Steuercodes ESC c3 und ESC c4 in "DRUCKSTEUERFUNKTIONEN".)

Papierende ----- Bei aufgebrauchtem Papiervorrat erkennt der Sensor im Papierweg in der Nähe des Druckkopfes das Ende der Papierrolle, schaltet das ERROR-Lämpchen ein und stoppt den Druckvorgang. (Siehe Funktion der Steuercodes ESC c3 und ESC c4 in "DRUCKSTEUERFUNKTIONEN".) Durch Einschieben von Papier in den Papierpfad wird die Papierrolle geladen.

Schneidemechanismus-Motorsperre ----- Wenn der Schneidepositionssensor in der Papierschneideeinheit bei laufendem Schneidemotor länger als ca. 1 Sekunde ein- oder ausgeschaltet ist, wird die Schneide- und Druckfunktion durch Sperren des Motors ausgeschaltet. Siehe 4.7 "Initialisierung des Schneidemechanismus".

3. FEED-Schalter

   Durch einmaliges kurzes Drücken dieser Taste wird das Papier um eine Zeile vorgeschoben. Durch anhaltendes Drücken wird das Papier laufend vorgeschoben. Diese Taste drücken, um ein Makro auszuführen, wenn das System die Ausführung eines Makros erwartet.

4. FEED-Schalter und Netzschalter

   Bei gleichzeitigem Drücken von FEED-Schalter und Netzschalter wird ein Testdruck durchgeführt.

4.10 Hexadezimal-Dumps

1. Hexadezimal-Dump-Funktion

   Diese Funktion ermöglicht die Ausgabe der vom Host-Computer gesendeten Daten in hexadezimaler Notation zusammen mit einem Ausdruck der korrespondierenden Zeichen.

2. Hexadezimal-Dump starten

   Bei geöffneter Abdeckung gleichzeitig Netzschalter und FEED-Taste drücken. Wenn die Abdeckung geschlossen ist, wird "Hexadecimal Dump" auf dem Papier ausgegeben, und dann werden die empfangenen Daten in hexadezimaler Form gedruckt, zusammen mit einem Ausdruck der korrespondierenden Zeichen.

   Hinweis:
   - Für Daten, zu denen kein korrespondierendes Zeichen existiert, wird "." gedruckt.
   - Während des Hexdezimal-Dumps können nur die Befehle DLE, EOT und DLE ENQ verwendet werden.
   - Falls weniger als eine Zeile mit Daten gedruckt werden soll, wird durch Drücken der FEED-Taste eine Einzelzeile ausgegeben.

3. Hexadezimal-Dump beenden

   Nach dem Druck der Daten wird die Funktion beendet, indem entweder das Gerät ausgeschaltet wird oder ein Zurücksetzen-Signal gesendet wird.

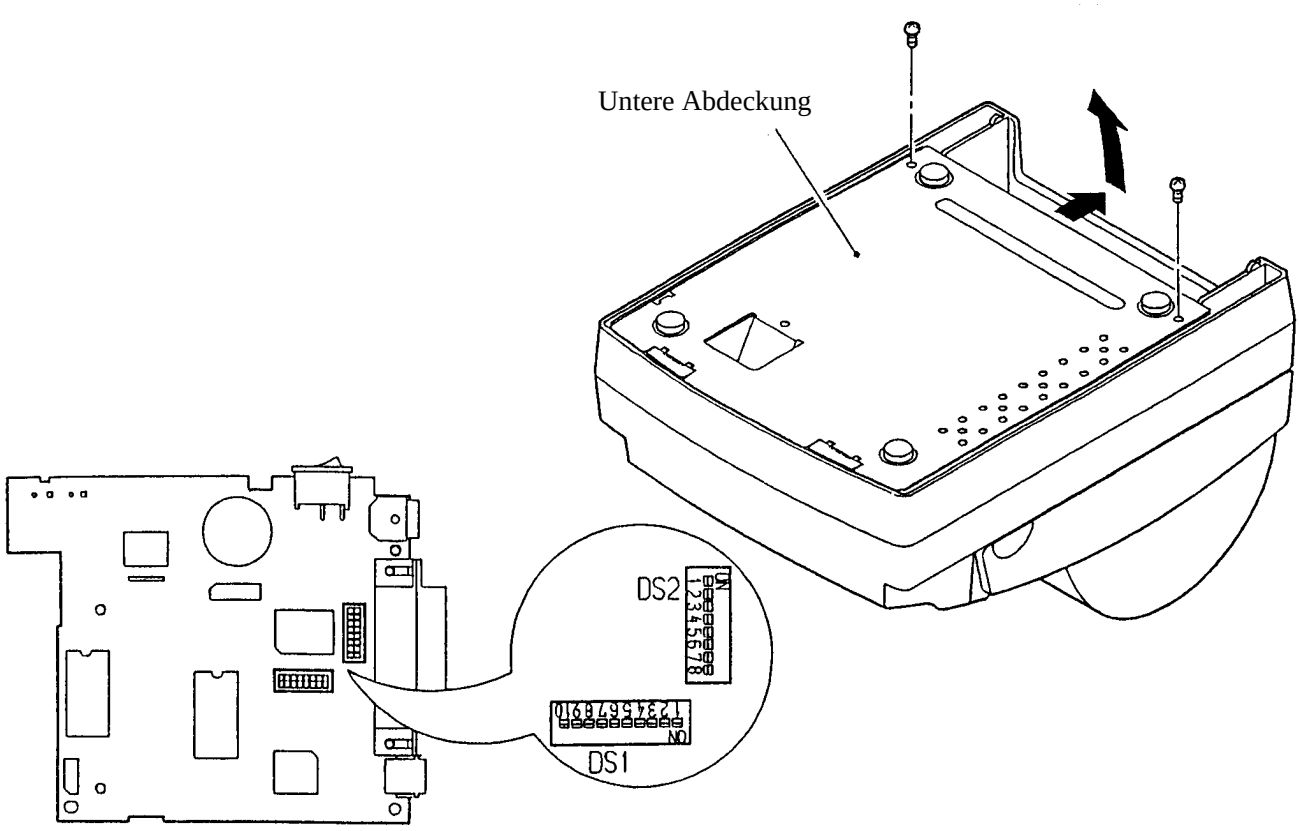
< Druckbeispiel >

```
=== Hexadecimal Dump ===
1B 21 00 1B 20 04 41 42 43 44   .!.. .ABCD
45 46 47 48 49 4A 4B 4C 4D 4E   EFGHIJKLMN
4F 50 0D 0A 31 32 33 34 35 36   OP..123456
0D 0A                           ..
```

5. DIP-SCHALTEREINSTELLUNG

5.1 Lage der DIP-Schalter

1. Das Gerät ausschalten.
2. Die untere Abdeckung durch Lösen der zwei Schrauben entfernen und das Gerät auf die Seite stellen, wie unten abgebildet.



5.2 DIP-Schalterfunktion

DS1

No.	Funktion	ON	OFF	Beim Versand
1	Automatische Schneideinheit	Ja	Nein	ON
2	Abdeckung geöffnet	Nein	Ja	OFF
3	CR-Umschalten	LF-Betrieb	Ignoriert	OFF
4	Japanische Schriftcode-Wahl	S-JIS	JIS	OFF
5	Puffergröße	72 bytes	4 K bytes	ON
6	Internationale Zeichen	Siehe Tabelle 1.		OFF
7	"			OFF
8	"			OFF
9	Druckdichte	Siehe Tabelle 2.		ON
10	"			OFF

Wenn "DS1-2 Abdeckung geöffnet" deaktiviert ist, ist auch ein Papiervorschub bei geöffneter Abdeckung möglich, und die Art der Papierzufuhr wechselt von "Automatisch" auf "Manuell".

DS2 (Der DIP-Schalter 2 wird nur für die serielle Schnittstelle verwendet.**)**

No.	Funktion	ON	OFF	Beim Versand
1	Bitlänge	7 Bit	8 Bit	OFF
2	Parität	Ja	Nein	OFF
3	Ungerade/Gerade	Gerade	Ungerade	OFF
4	Kommunikationsmodus	XON/XOFF	DTR/DSR	OFF
5	Baudrate	Siehe Tabelle 3.		OFF
6	"			ON
7	"			ON
8	Nicht verwendet	—		

Table 1 Internationale Zeichen

	USA	Frankreich	Deutschland	Großbritannien	Dänemark- I	Schweden	Italien	Japan
DS1-6	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DS1-7	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DS1-8	OFF	OFF	OFF	OFF	ON	ON	ON	ON

Table 2 Druckdichte

	Stufe 1	Stufe 2	Stufe 3	Stufe 4
DS1-9	OFF	ON	OFF	ON
DS1-10	OFF	OFF	ON	ON

Table 3 Baudrate

	150	300	600	1200	2400	4800	9600	19200
DS2-5	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DS2-6	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DS2-7	OFF	OFF	OFF	OFF	ON	ON	ON	ON

6. PARALLELSCHNITTSTELLE

6.1 Bidirektionale Parallelschnittstelle (IEEE 1284)

6.1.1 Kompatibilitätsmodus (Übertragung Host-Computer → Drucker über die Centronics-Schnittstelle)

(1) Übersicht

Die bekannte Centronics-Schnittstelle wird im Kompatibilitätsmodus verwendet.

(2) Technische Daten

Datenübertragung	: 8 Bit parallel
Synchronisierung	: externes nStrobe-Signal
Handshake-Betrieb	:nAck- und Busy-Signale
Signalpegel	: Alle Signale sind TTL-kompatibel.
Buchse	: 57LE-40360 oder entsprechendes (IEEE, 1284 Typ B)

6.1.2 Reverse-Modus (Übertragung Drucker → Host-Computer)

Statusdaten können vom Drucker zum Host-Computer entweder im Nibble- oder im Byte-Modus gesendet werden.

Übersicht:

Ausgangspunkt ist, daß Daten von einem asynchronen Drucker vom Host-Computer gesteuert übertragen werden.

Die vorhandenen Steuerleitungen werden zur Datenübertragung im Nibble-Modus (Übertragung in Einheiten von 4 Bit (Nibbles)) verwendet. Daten werden in beiden Richtungen auf den 8 Datenleitungen im Byte-Modus (Einheiten von 8 Bit (Bytes)) übertragen.

Eine gleichzeitige Ausführung zusammen mit dem Kompatibilitätsmodus ist nicht möglich; Übertragungen im Halbduplexverfahren sind möglich. Einzelheiten siehe Anhang 2.

6.1.3 Pinbelegung der Buchse

Pin No.	Signalquelle	Kompatibilitätsmodus	Nibble-Modus	Byte-Modus
1	Host	nStrobe	HostClk	HostClk
2	Drucker	Data0(LSB)	Data0(LSB)	Data0(LSB)
3	Host/ Drucker	Data1	Data1	Data1
4	Host/ Drucker	Data2	Data2	Data2
5	Host/ Drucker	Data3	Data3	Data3
6	Host/ Drucker	Data4	Data4	Data4
7	Host/ Drucker	Data5	Data5	Data5
8	Host/ Drucker	Data6	Data6	Data6
9	Host/ Drucker	Data7(MSB)	Data7(MSB)	Data7(MSB)
10	Drucker	nAck	PtrClk	PtrClk
11	Drucker	Busy	PtrBusy/Data3.7	PtrBusy
12	Drucker	PError	AckDataReq/Data2.6	AckDataReq
13	Drucker	Select	XFlag/Data1.5	XFlag
14	Host	nAutoFd	HostBusy	HostBusy
15		(NC)	(ND)	(Undefined)
16		GND	GND	GND
17		FG	FG	FG
18	Drucker	Logik-H	Logik-H	Logic-H
19		GND	GND	GND
20		GND	GND	GND
21		GND	GND	GND
22		GND	GND	GND
23		GND	GND	GND
24		GND	GND	GND
25		GND	GND	GND
26		GND	GND	GND
27		GND	GND	GND
28		GND	GND	GND
29		GND	GND	GND
30		GND	GND	GND
31	Host	nInit	nInit	nInit
32	Drucker	nFault	nDataAvail/Data0.4	nDataAvail
33		GND	(ND)	(ND)
34	Drucker	DK_STATUS	(ND)	(ND)
35	Drucker	+5V	(ND)	(ND)
36	Host	nSelectIn	IEEE 1284 Active	IEEE 1284 Active

NC: Keine Verbindung

ND: Nicht definiert

- "n" vor dem Signal bedeutet, daß es bei "L" aktiv ist.
- Es ist keine bidirektionale Übertragung möglich, wenn eines der oben aufgeführten Signale fehlt.
- Es sollten immer verdrillte Adern für die Signalleitungen verwendet werden; die Rückleitungen müssen mit Signalmasse verbunden sein.

- Sicherstellen, daß die Schnittstelle mit TTL-Pegel-Signalen arbeitet, die den im folgenden aufgeführten Merkmalen entsprechen, und daß die Signalumschaltzeit 0,5 µsec beträgt.
- Wenn die Signale nAck und Busy bei der Datenübertragung nicht beachtet werden, kann dies zu Datenverlusten führen.
- Das Schnittstellenkabel sollte so kurz wie möglich sein.

9. WARTUNG UND DIENST

Bitte wenden Sie sich an die folgenden Stellen für weitergehende Informationen.

Nordamerika	Andere Gebiete
CBM America Corporation	Japan CBM Corporation
Service Center	Information Systems Division
363 Van Ness Way	CBM Bldg., 5-68-10, Nakano
Suite 404	Nakano-ku, Tokyo 164-0001
Torrance, CA 90501, USA	Japan
TEL +1-310-781-1460	TEL +81-3-5345-7540
FAX +1-310-781-9157	FAX +81-3-5345-7541

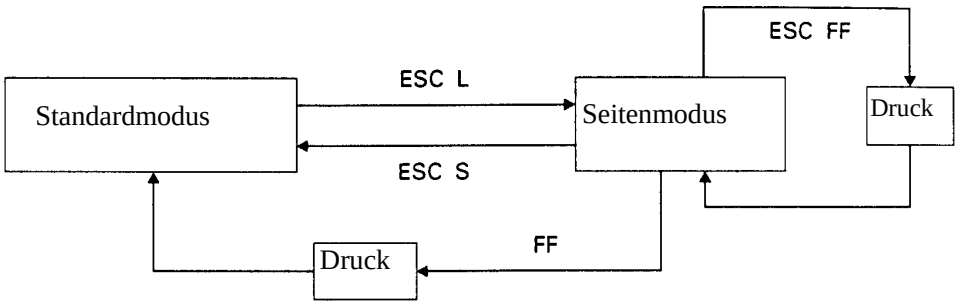
ANHANG 1. SEITENMODUS

Übersicht

Dieser Drucker verfügt über zwei Druckmodi: Standardmodus und Seitenmodus.

Im Standardmodus führt der Drucker den Druckbefehl bzw. den Befehl zum Papiervorschub sofort aus, wenn er einen entsprechenden Befehl erhält. Erhält der Drucker im Seitenmodus Druckbefehle bzw. Befehle zum Papiervorschub, legt er sie nur im vorgesehenen Druckbereich im Speicher ab. Nur wenn die Befehle ESC FF oder FF erteilt werden, werden alle im Druckbereich abgelegten Daten in einem Durchgang ausgegeben.
Nehmen wir als Beispiel an, Sie haben einen Druckbefehl und einen Befehl zum Zeilenvorschub mit den Daten "ABCDEF"<LF> gegeben. Im Standardmodus werden die Daten "ABCDEF" gedruckt und das Papier um eine Zeile vorgeschoben. Im Seitenmodus werden die Daten "ABCDEF" im vorgesehenen Druckbereich des Speichers abgelegt, und der Speicherbereich zum Speichern der folgenden Druckdaten wird um eine Zeile verschoben. Dieser Drucker wechselt mit dem Befehl ESC L in den Seitenmodus; ab diesem Zeitpunkt werden alle empfangenen Befehle im Seitenmodus gehandhabt. Sobald der Befehl ESC FF erteilt wird, werden alle bis zum diesem Zeitpunkt empfangenen Daten in einem Durchgang gedruckt. Sobald der Befehl FF erteilt wird, werden alle bis zu diesem Zeitpunkt empfangenen Daten in einem Durchgang gedruckt, danach kehrt der Drucker in den Standardmodus zurück. Nach dem Befehl ESC S kehrt der Drucker sofort in den Standardmodus zurück; dabei werden alle im Seitenmodus gespeicherten Druckdaten gelöscht, statt gedruckt zu werden.

[Wechsel zwischen Standardmodus und Seitenmodus]



Befehlswerte im Standardmodus und im Seitenmodus

(1) Die mit Befehlen gesetzten Werte sind im Standard- und im Seitenmodus prinzipiell gleich. Allerdings werden Werte, die mit einem der unten aufgeführten Befehlen gesetzt werden, im Standard- und im Seitenmodus unterschiedlich behandelt und gespeichert.

ESC SP, ESC 2, ESC 3, FS S

(2) Die maximale Größe, in der ein Bitmap-Bild im Standardmodus gedruckt werden kann, beträgt 512 mal 512 Punkte. Im Seitenmodus kann die Größe in y-Richtung (Richtung des Papiervorschubs) auf bis zu 831 Punkte vergrößert werden, wenn 831 Bits für den y-Wert des Druckbereichs reserviert wurden und der Wert (festgelegt durch die Befehl ESC T) für die Druckrichtung "n" 1 oder 3 beträgt.

Druckdaten im Druckbereich ablegen

Druckdaten werden wie folgt im Druckbereich abgelegt:

(1) Der Druckbereich wird mit dem Befehl ESC W festgelegt. Wenn der Drucker alle Druck- und Papiervorschubbefehle abgearbeitet hat, bevor er den Befehl ESC W erhält, setzt ESC W die linke Kante (von vor dem Drucker stehend betrachtet) als Nullpunkt (x0, y0) des Druckbereichs. Der Druckbereich wird durch ein Rechteck festgelegt, das durch zwei vom Nullpunkt (x0, y0) ausgehenden Geraden definiert wird: eine Gerade verläuft in x-Richtung (horizontal) in einer Länge von dx Schaltschritten (inklusive des Startpunkts), und die andere in y-Richtung (vertikal) in einer Länge von dy Schaltschritten. (Wenn der Befehl ESC W nicht definiert ist, werden zur Festlegung des Druckbereichs die Standardwerte verwendet.)

(2) Wenn mit dem Befehl ESC W ein Druckbereich und mit dem Befehl ESC T eine Druckrichtung definiert wurde, werden, sobald der Drucker Druckdaten empfängt, diese im Druckbereich abgelegt, wobei Punkt A (siehe Abbildung "Position für Zeichendaten") als Ausgangswert für den Startpunkt verwendet wird. Wenn die Druckdaten aus Zeichen bestehen, definiert der Startpunkt die Grundlinie.

Wenn die Druckdaten ein geladenes Bitmap-Bild oder einen Strichcode enthalten, werden die Druckdaten mit ihrem unteren linken Eckpunkt "B" an der Grundlinie ausgerichtet abgelegt (siehe Abbildung "Ablagepositionen für Druckdaten").

Wenn allerdings versucht wird, HRI-Zeichen eines Strichcodes abzulegen, werden diejenigen Teile nicht gedruckt, die über die Standardzeichenhöhe hinausragen.

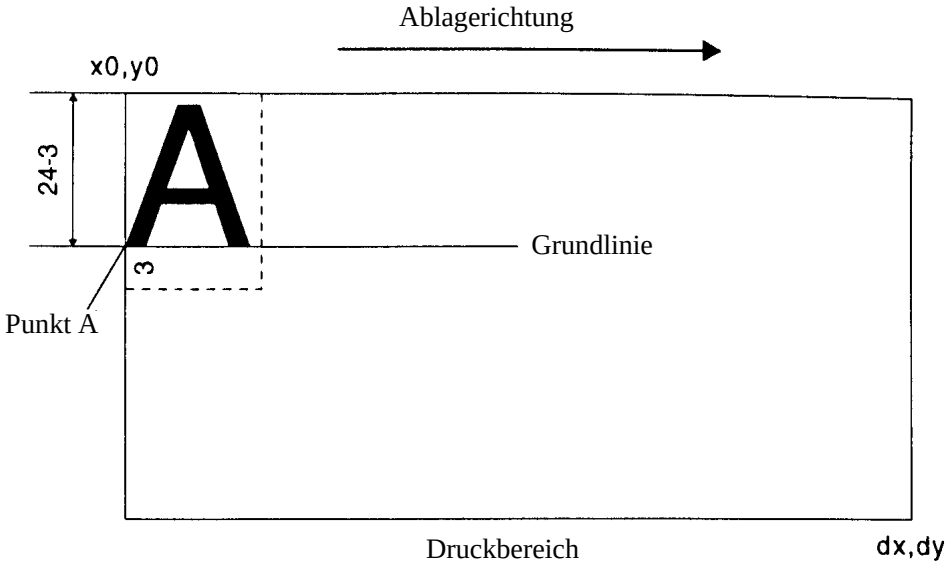
(3) Wenn Druckdaten (oder der Raum rechts eines Zeichens) den Druckbereich überschreiten, bevor ein Befehl empfangen wird, der einen Zeilenvorschub auslöst (beispielsweise die Befehle LF oder ESC J), wird automatisch ein Zeilenvorschub ausgelöst, so daß die Ablageposition der Druckdaten um eine Zeile verschoben ist. Die nächste Position ist der Anfang dieser Zeile. Der Zeilenvorschub ist dabei durch Befehle wie ESC 2 oder ESC 3 festgelegt.

(4) Standardmäßig beträgt ein Zeilenvorschub 1/6 Zoll, was 30 Punkten entspricht. Wenn die Druckdaten für die nächste Zeile ein Zeichen in doppelter oder noch größerer Höhe, ein geladenes Bitmap-Bild, das sich über zwei oder mehr Zeilen erstreckt, oder einen Strichcode enthalten, der höher ist als die Zeichenhöhe, ist der Zeilenvorschubwert für die Druckdaten zu klein. Die oberen Druckpunkte der Zeichen überschreiben dann die Druckdaten der aktuellen Zeile. Der Wert für den Zeilenvorschub muß demzufolge erhöht werden.
Im folgenden Beispiel muß der Wert für den Zeilenvorschub für die erste Zeile mindestens 27 Punkte betragen (siehe Abbildung "Ablagepositionen für geladenes Bitmap-Bild").

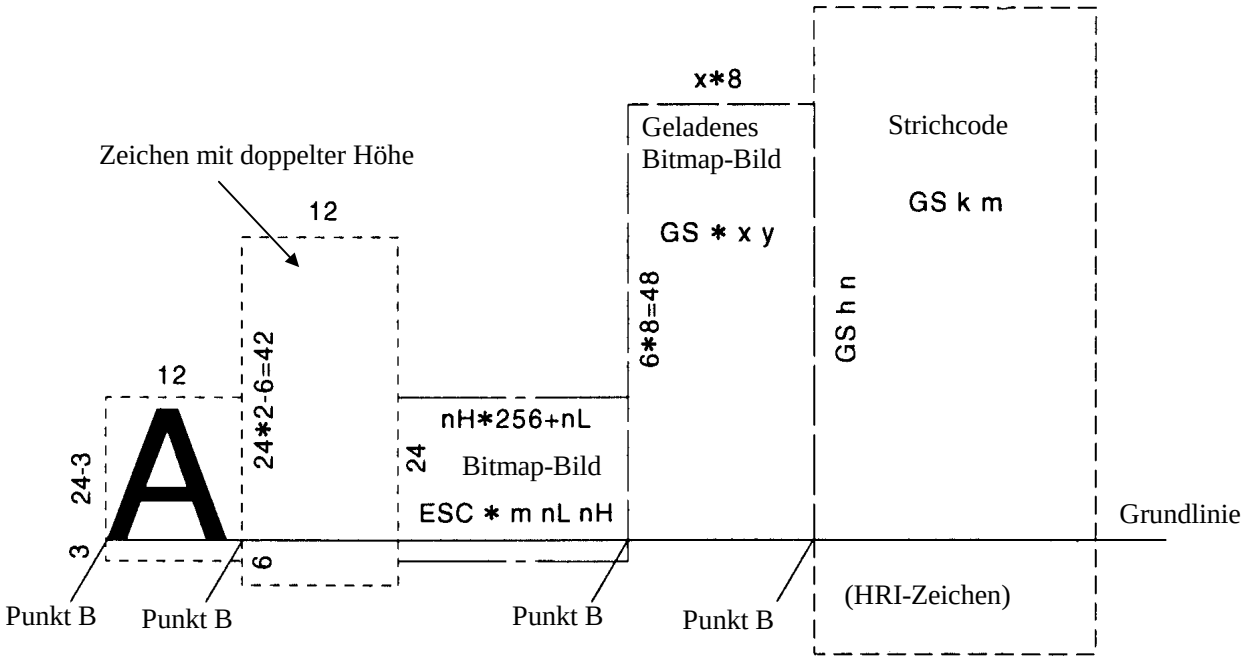
< Beispiel: Druck eines geladenen Bitmap-Bildes, das vertikal sechs Bytes umfaßt>
[Vertikal abgelegte Punkte (= 8 (6) - Zeilenvorschubwert für den Startpunkt (=21)]
(Umrechnungsverhältnis für die vertikale Schrittweite (=360/180) = 54)]
Daher muß der Wert für den Zeilenvorschub um 54 Pitch bzw. 27 Punkt erhöht werden.

```
ESC W, xL,xH, yL, yH, dxL, dxH, dyL, dyH
ESC Tn
ESC 3 54      ←(Erhöhung des Zeilenvorschubwerts)
LF
GS/1
ESC2     ←(Zeilenvorschubwert wieder auf 1/6 Zoll setzen)
```

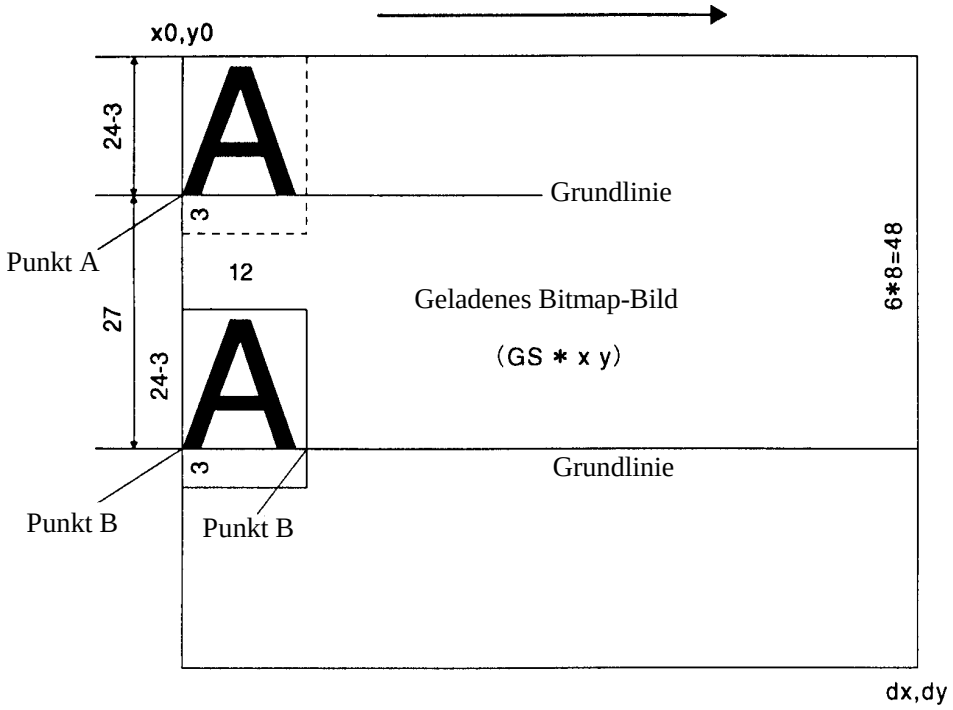
Hinweis. Da der Standardwert für die Schrittweite in horizontaler Richtung 1/180 und in vertikaler 1/360 beträgt, können, abhängig von der Druckrichtung, Fehler auftreten, wie beispielsweise bei der Festlegung der Position. Es treten keine Fehler auf, wenn der Wert für die Schrittweite in vertikaler Richtung mittels des GSP-Befehls auf 1/180 gesetzt ist.



[Ablagepositionen für Zeichendaten]



[Ablagepositionen für Druckdaten]



[Ablagepositionen für geladene Bitmap-Bilder]

Beispiel für den Einsatz des Seitenmodus

Der folgende Abschnitt erläutert die besonderenVerwendungsmöglichkeiten des Seitenmodus.

Zur Verwendung des Seitenmodus sendet der Host-Computer Befehle normalerweise in dieser Abfolge zum Drucker:

(1) ESC L versetzt den Drucker in den Seitenmodus.

(2) ESC W legt den Druckbereich fest.

(3) ESC T legt die Druckrichtung fest.

(4) Die Druckdaten werden gesendet.

(5) FF weist den Drucker an, die Druckdaten in einem Durchgang auszugeben.
Nach dem Druck kehrt der Drucker in den Standardmodus zurück.

< Beispiel 1>

```
100 PRINT#1, chr$(&H1b); "L"
110 PRINT#1, chr$(&H1b); "W";chr$(0);chr$(0);chr$(0);chr$(0);
120 PRINT#1, chr$(200) ;chr$(0);chr$(144);chr$(1);
130 PRINT#1, chr$(&H1b); "T";chr$(0);
140 PRINT#1, "Page mode lesson Test1"
150 PRINT#1, chr$(&Hc);
```

Das Programm in Beispiel 1 reserviert einen Druckbereich von 200 (400 Schritte ausgehend vom Startpunkt (0, 0) und gibt dann den Text "Page mode lesson Test1" in der ersten Zeile des Druckbereichs aus, wie in Abbildung 1-1 gezeigt.

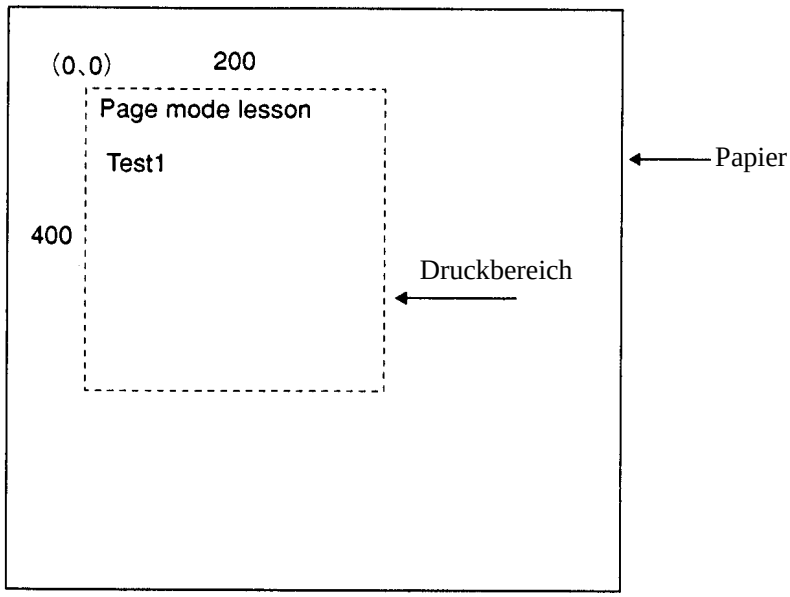


Abbildung 1-1

In Abbildung 1-1 erfolgt ein Zeilenvorschub zwischen "lesson" und "Test1", weil "lesson" und den darauf folgenden Leerschritt " " den Horizontalwert des Druckbereichs von 200 (400 Schritten überschreiten. Der Zeilenvorschubwert entspricht dem Wert, der durch einen Befehl wie beispielsweise ESC 3 festgelegt wurde.
Es ist möglich, vor der Ausführung von FF soviele Druckbereiche wie gewünscht einzurichten. Wenn sich Druckbereiche überschneiden, werden die Daten dieser Druckbereiche mit AND verknüpft.
Mit dem Befehl CAN können Sie einen Teil der abgelegten Daten löschen. Er löscht alle Daten im festgelegten Druckbereich. Dazu definieren Sie mit ESC W einen Druckbereich, der den zu löschenden Teil umfaßt und führen dann den Befehl CAN aus, um diesen Datenteil zu löschen.
Beachten Sie dabei unbedingt, daß sämtliche Zeichenteile, die sich in diesem Druckbereich befinden, gelöscht werden.

< Beispiel 2>

```
100 PRINT#1, chr$(&H1b); "L"
110 PRINT#1, chr$(&H1b); "W";chr$(0);chr$(0);chr$(0);chr$(0);
120 PRINT#1, chr$(200) ;chr$(0);chr$(144);chr$(1);
130 PRINT#1, chr$(&H1b); "T";chr$(0);
140 PRINT#1, "Page mode lesson 2 CAN command"
150 PRINT#1, chr$(&HA);
160 PRINT#1, "ABCDEFGHIJKLMNOPQRST1234567890"
170 PRINT#1, chr$(&Hc);
```

Als erstes wird mit dem Befehl ESC L in den Seitenmodus (Zeile 100) gewechselt. Dann werden zur Reservierung eines Druckbereichs mit ESC W acht Argumente gesendet (n1 bis n8). In diesem Beispiel werden die Argumente in der Abfolge 0, 0, 0, 0, 200, 0, 144, und 1 gesendet, um so einen Druckbereich zu reservieren, der sich vom Startpunkt (0, 0) aus 200 in die x-Richtung und 400 in die y-Richtung erstreckt (Zeilen 110 - 120). Außerdem wird mit ESC T die Druckrichtung 0 festgelegt (Zeile 130).
Nach der oben erläuterten Einrichtung werden die Druckdaten gesendet (Zeilen 140 - 160). Schließlich wird der Befehl FF gesendet (Zeile 170), um die Ausgabe des in Abbildung 1-2 gezeigten Ausdrucks zu starten.

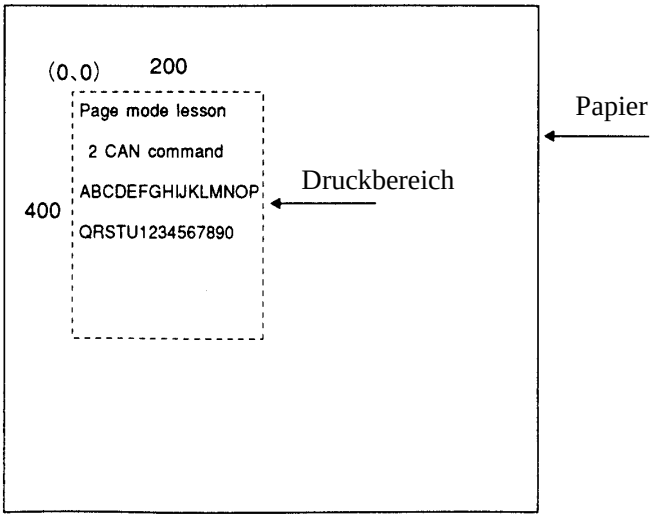


Abbildung 1-2

Vor dem Versenden eines Befehls FF besteht die Möglichkeit, den folgenden Programmcode hinzuzufügen, um einen Teil der Daten zu löschen.

```
170 PRINT#1, chr$(&H1b); "W";chr$(72);chr$(0);chr$(120);chr$(0);
180 PRINT#1, chr$(36) ;chr$(0);chr$(48);chr$(0);
190 PRINT#1, chr$(&H18);
200 PRINT#1, chr$(&Hc);
```

Als Ergebnis des zusätzlichen Programmcodes erfolgt der Druck wie in Abbildung 1-3 gezeigt, in welchem die Zeichenkette "GH1" gelöscht wurde. Wenn Daten mit dem Befehl CAN gelöscht werden, wird der gelöschte Bereich nicht mit den verbleibenden Daten aufgefüllt, sondern er wird in eine Folge von Leerschritte konvertiert.

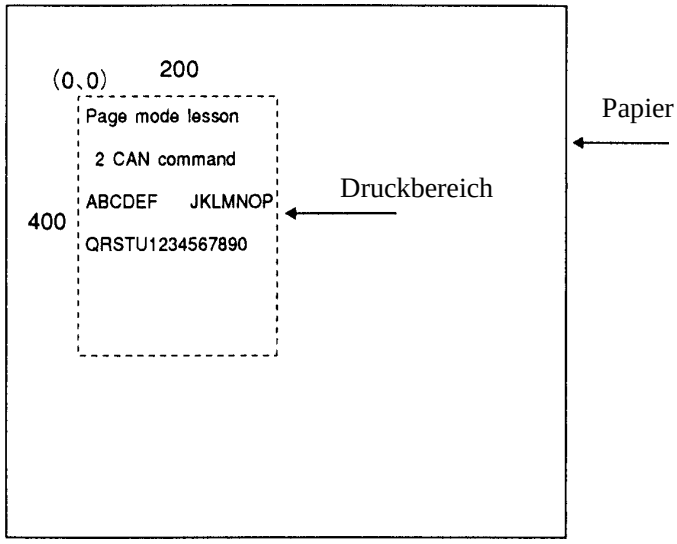


Abbildung 1-3

ANHANG 2. BIDIREKTIONALE PARALLELSCHNITTSTELLE

1. Übersicht

Die Schnittstelle dieses Druckers ist ein Level-1-kompatibles Gerät gemäß IEEE-P1284. Sie unterstützt die unten in Abschnitt 1.1 beschriebenen Übertragungsmodi.

1.1 Übertragungsmodi der Parallelschnittstelle

Die Parallelschnittstelle dieses Druckers verfügt über drei Übertragungsmodi, die unten beschrieben werden. Wenn der Drucker eingeschaltet oder zurückgesetzt wird, wird er standardmäßig in den Kompatibilitätsmodus geschaltet.

- Kompatibilitätsmodus

  Daten werden vom Host-Computer zum Drucker in Byte-Einheiten übertragen. Normalerweise wird dieser Modus zur Übertragung von Daten verwendet. Die anderen Modi werden vom Kompatibilitätsmodus aus aufgerufen.

- Nibble-Modus

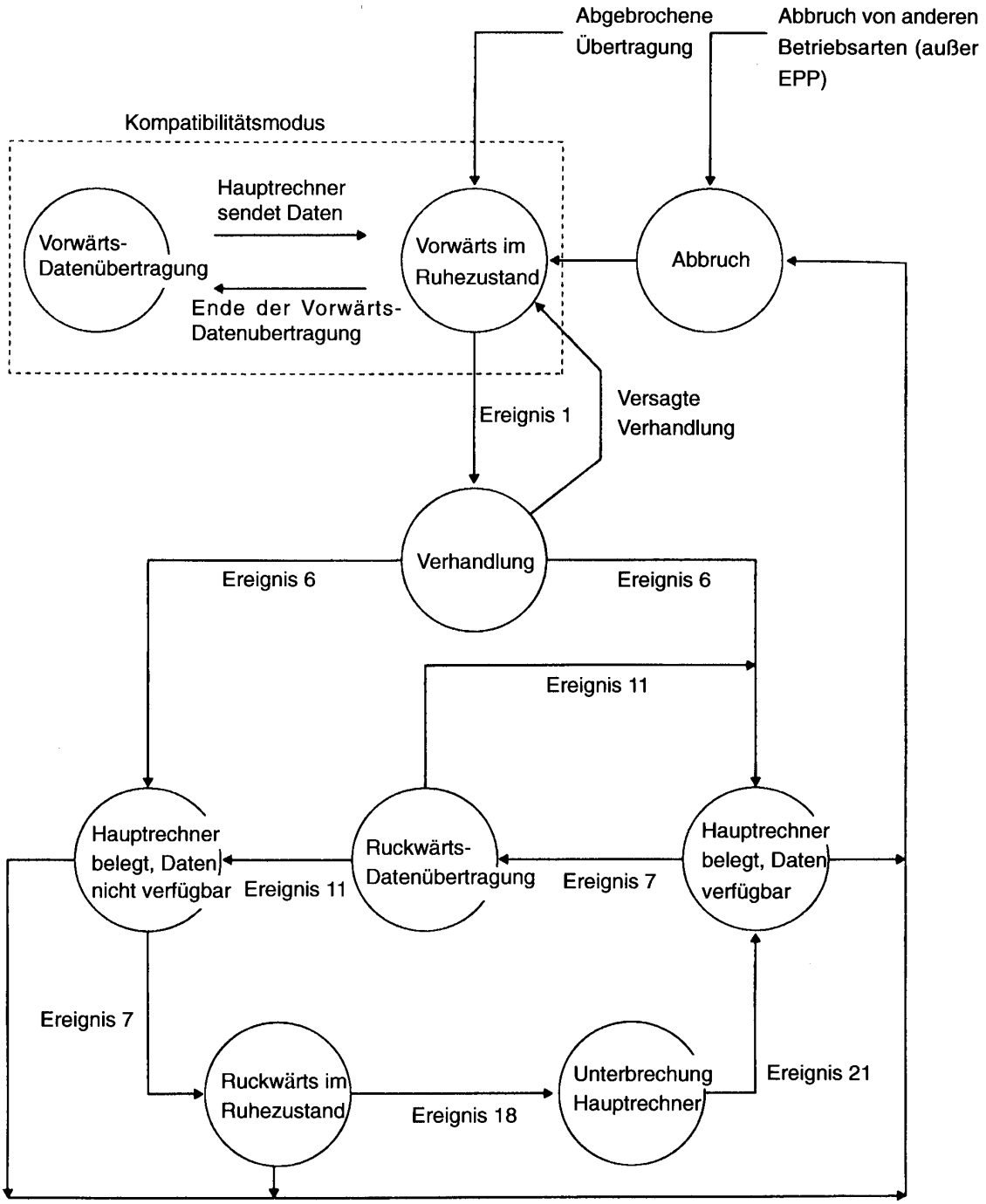
  Daten werden vom Drucker zum Host-Computer in Einheiten von vier Bits übertragen. Bei der Datenübertragung vom Drucker wird eine Statussignalleitung verwendet. Um in diesem Modus eine Datenmenge von einem Byte zu senden, werden zweimal hintereinander Vier-Bit-Daten gesendet.

- Byte-Modus

  Daten werden vom Drucker zum Host-Computer in Einheiten von einem Byte übertragen. Bei der Datenübertragung vom Drucker wird eine 8-Bit-Daten-Signalleitung verwendet. Zum Einsatz des Byte-Modus muß der Host-Computer in der Lage sein, die Signallaufrichtung über die 8-Bit-Daten-Signalleitung umzuschalten. Die Übertragung vom Host-Computer zum Drucker wird Forward-Modus (Vorwärtsmodus) genannt, die Übertragung vom Drucker zum Host-Computer Reverse-Modus (Rückwärtsmodus).

1.2 Kommunikationsphasen

Der Kommunikationsvorgang in den einzelnen Übertragungsmodi unterteilt sich in unterschiedliche Phasen. Zusätzlich gibt es eine Phase für die Modusinitialisierung und eine Phase für den Moduswechsel. Die Kommunikationssignale in den verschiedenen Modi und Phasen werden unterschiedlich benannt und haben unterschiedliche Funktionen.



2. Verhandlung

2.1 Übersicht

Normalerweise befindet sich der Drucker nach dem Einschalten im Kompatibilitätsmodus, welcher der Centronics-Kommunikationsphase entspricht. Wenn der Host-Computer in den Nibble- oder Byte-Modus umschalten will, sendet er eine Anfrage und handelt das Umschalten mit dem Drucker aus. Im folgenden wird die übliche Abfolge bei der Verhandlung dargestellt.

1) Der Host-Computer setzt das Active-Signal gemäß IEEE 1284 auf High. Als Reaktion darauf wechselt der Drucker in die Verhandlungsphase.
2) Der Drucker meldet, ob er in den vom Host-Computer angeforderten Modus wechseln kann.
3) Die Verhandlungsphase des Kommunikationsvorgangs wird abgeschlossen und die Übertragungsphase beginnt.

2.2 Vorgehensweise bei der Verhandlung

Die Verhandlungen verlaufen wie folgt:

1) Im Übertragungsmodus gemäß IEEE 1284 befinden sich Host-Computer und Drucker standardmäßig im Kompatibilitätsmodus. Der Kompatibilitätsmodus besteht solange fort, bis der Host-Computer das angeschlossene Gerät als zu IEEE 1284 kompatibles Gerät erkennt.
2) Zum Start der Verhandlungen setzt der Host-Computer das Übertragungsmodus-Anforderungsbit auf den Datenpfad (Event 0).
3) Der Host-Computer setzt IEEE 1284 Active (nSelectln) auf High und HostBusy (nAutoFd) auf Low (Event 1).
4) Der Drucker antwortet, indem er PtrClk (nAck) auf Low, nDataAvail (nFault) auf High, Xflag (Select) auf High und AckDatReq (PError) auf High setzt (Event 2).
5) Der Host-Computer setzt HostClk (nStrobe) auf Low. Als Reaktion sperrt der Drucker das Übertragungsmodus-Anforderungsbit (Event 3).
6) Der Host-Computer setzt HostClk (nStrobe) und HostBusy (nAutoFd) auf High (Event 4).
7) Wenn der Drucker Übertragungsdaten hat, die für den Host-Computer bestimmt sind, setzt er AckDataReq (PError) auf Low, nDataAvail (nFault) auf Low und Xflag (Select) auf denjenigen Wert, der dem Übertragungsmodus entspricht (Event 5).

   Xflag: Nibble-Modus Low, Byte-Modus High
8) Der Drucker setzt PtrClk (nAck) auf High, um anzuzeigen, daß er bereit ist, die Statusleitung zu lesen (Event 6).
9) Wenn der Drucker Übertragungsdaten hat, die für den Host-Computer bestimmt sind, wechselt der Host-Computer in die Phase "Host Busy Available" oder "Termination" und kehrt dann in den Kompatibilitätsmodus zurück.

10) Wenn der Drucker keine Übertragungsdaten hat, die für den Host-Computer bestimmt wären, wechselt der Host-Computer in die Phase "Host Busy Data Not Available" oder "Termination" und kehrt dann in den Kompatibilitätsmodus zurück.
11) Wenn der Drucker den vom Host-Computer angeforderten Übertragungsmodus nicht unterstützt, setzt er Xflag (Select) wie folgt:

    Wenn der Nibble-Modus angefordert wurde: High
    Wenn der Byte-Modus angefordert wurde: Low

2.3 Besonders beachten

1) Die Verhandlungsphase wird von der steigenden Flanke des vom Host-Computer gesendeten Active-Signals gemäß IEEE 1284 ausgelöst.
2) Im Kompatibilitätsmodus folgt der Moment, an dem der Verhandlungsvorgang startet, im allgemeinen zu dem Zeitpunkt, an dem der Host-Computer nStrobe auf High setzt und der Drucker daraufhin den nAck-Impuls gibt. Sobald das nStrobe-Signal auf High gesetzt wurde, wechselt der Drucker allerdings sofort in die Verhandlungsphase, wenn er feststellt, daß IEEE 1284 Active auf High steht. Dies gilt selbst dann, wenn der nAck-Impuls erst noch gegeben werden muß oder gerade in diesem Augenblick erfolgt. In diesem Fall wird kein nAck-Impuls gegeben, falls der Drucker nach der Terminierung in den Kompatibilitätsmodus zurückgewechselt ist.
3) In die Verhandlungsphase kann vom Busy- oder Error-Status des Kompatibilitätsmodus aus eingetreten werden. In diesem Fall kehrt der Drucker nicht in den Busy- oder Error-Status zurück, in dem er sich vor den Verhandlungen befand, sondern in denjenigen Druckerstatus, in dem er sich nach der Terminierung befindet.
4) Wenn der Host-Computer einen Übertragungsmodus angefordert hat, der vom Drucker nicht unterstützt wird, muß er in die Terminierungsphase eintreten und dann in den Kompatibilitätsmodus zurückkehren.

Tabelle 2.4.1 Definitionen der Anforderungsbits im Übertragungsmodus gemäß IEEE 1284

Bit	Definition	Bitwerte (76543210)	Hex.	Xflag	
				Wenn unterstützt	Von diesem Drucker
7	Anforderung einer Dehnbarkeitsverbindung	10000000	80H	High	Low
6	Anforderung von EPP-Modus	01000000	40H	High	Low
5	Anforderung von ECP-Modus mit RLE	00110000	30H	High	Low
4	Anforderung von ECP-Modus	00010000	10H	High	Low
3	Reserve	00001000	08H	High	Low
2	Anforderung von Gerät-ID: Datenrückführung unter Verwendung von Tetrade-Modus, Rückwärtskanalübertragung Byte-Modus, Rückwärtskanalübertragung ECP-Modus, Übertragung ohne RLE ECP-Modus, Übertragung mit RLE	 00000100 00000101 00010100 00110100	 04H 05H 14H 34H	 High High High High	 High High Low Low
1	Reserve	00000010	02H	High	Low
0	Byte-Modus, Rückwärtskanalübertragung	00000001	01H	High	Low
Ohne	Nibble-Modus, Rückwärtskanalübertragung	00000000	00H	Low	Low
	Illegale oder widersprüchliche Anforderung	Anders als oben	Anders als oben	—	Low

Hinweis: Dieser Drucker unterstützt nur den Nibble- und den Byte-Modus. Wenn ein anderer Modus angefordert wird, geht Xflag auf Low.

2.4 Datenübertragung vom Drucker zum Host-Computer

2.4.1 Nibble-Modus

In diesem Modus werden Daten zwischen Drucker und Host-Computer entsprechend der unten beschriebenen Vorgehensweise übertragen. Die Schritte, beginnend mit 1), sind relevant, wenn aus der Verhandlungsphase in die Phase "Host Busy Data Available" gewechselt wurde. Wenn aus der Verhandlungsphase in die Phase "Host Busy Data Not Available" gewechselt wurde, sind die Schritte beginnend mit Schritt 9) relevant.

1) Nach Abschluß der Verhandlungen zum Wechsel in den Nibble-Modus setzt der Host-Computer HostBusy (nAutoFd) auf Low zur Anzeige, daß er zum Empfang von Daten vom Drucker bereit ist (Event 7).
2) Der Drucker legt die unteren vier Bits auf die Rückkanal-Datenleitung und setzt PtrClk (nAck) auf Low (Events 8 und 9).
3) Der Host-Computer setzt HostBusy (nAutoFd) auf High zur Anzeige, daß er Daten gesperrt und das Signal in Event 9 empfangen hat (Event 10).
4) Der Drucker setzt PtrClk (nAck) auf High. Damit ist die Übertragung des ersten Nibbles abgeschlossen (Event 11).
5) Die Schritte 1) bis 3) werden zur Übertragung der oberen vier Bits wiederholt, bevor mit den Schritten 6) und folgenden fortgefahren wird.
6) Nachdem der Host-Computer HostBusy (nAutoFd) auf High gesetzt (Event 10) und Daten empfangen hat, muß der Drucker die vier Statusleitungen wie unten gezeigt belegen (Event 13).
   - PtrBusy (Busy): Zurückgekehrt in den Status, der im Forward-Modus galt.
   - nDataAvail (nFault): Auf Low gesetzt, wenn Daten zu senden sind.
   - AckDataReq (PError): Auf Low gesetzt, wenn Daten zu senden sind.
   - Xflag (Select): Auf den aktuellen Modus (beispielsweise auf Low) gesetzt.
7) Der Drucker setzt PtrClk (nAck) auf High (Event 11).
8) Nach Event 11 prüft der Host-Computer die Signale, die der Drucker in Event 13 gesetzt hat. Anhand dieser Prüfung erkennt der Host-Computer:
   1. ob weitere Daten vorliegen, die vom Drucker zum Host-Computer gesendet werden sollen, und
   2. ob Daten vom Host-Computer zum Drucker gesendet werden können.
9) Wenn nach der Übertragung eines Bytes (zwei Nibble) keine weiteren Daten vorliegen, die der Drucker senden will, wählt der Host-Computer einen der folgenden drei Stati:
   1. Durchführung der Terminierung und Rückkehr in den Kompatibilitätsmodus
   2. Verbleib in der Phase "Host Busy Data Not Available"
   3. Setzen von HostBusy (nAutoFd) auf Low (Event 7) und Wechsel in die Phase "Reverse Idle".
10) Wenn nach der Übertragung eines Bytes (zwei Nibble) der Drucker weitere Daten senden will, wählt der Host-Computer einen der folgenden drei Stati:

1. Setzen von HostBusy (nAutoFd) auf Low und Signalisierung, daß der Host-Computer bereit zum Empfang ist.
2. Verbleib in der Phase "Host Busy Data Available"
3. Durchführung der Terminierung und Rückkehr in den Kompatibilitätsmodus

11) Falls der Host-Computer die Phase "Host Busy Data Available" gewählt und HostBusy (nAutoFd) auf Low gesetzt hat, wiederholt der Drucker die Schritte von 2) an.
12) Falls der Host-Computer die Phase "Reverse Idle" gewählt hat und vom Drucker neue Daten gesendet werden sollen, setzt der Drucker PtrClk auf Low, um vom Host-Computer eine Unterbrechung anzufordern (Event 18).
13) Der Drucker setzt PtrClk zurück auf High (Event 19).
14) Auf eine Unterbrechungsanforderung vom Drucker reagiert der Host-Computer, indem er HostBusy (nAutoFd) auf High setzt (Event 20).
15) Schließlich antwortet der Drucker dem Host-Computer, indem er AckDataReq (PError) auf Low setzt; der Host-Computer wechselt daraufhin in die Phase "Host Busy Data Available" (Event 21).

2.4.2 Byte-Modus

In diesem Modus werden Daten zwischen Drucker und Host-Computer entsprechend der unten beschriebenen Vorgehensweise übertragen. Die Schritte, beginnend mit 1), sind relevant, wenn aus der Verhandlungsphase in die Phase "Host Busy Data Available" gewechselt wurde. Wenn aus der Verhandlungsphase in die Phase "Host Busy Data Not Available" gewechselt wurde, sind die Schritte beginnend mit 9) relevant.

1) Nach Abschluß der Verhandlungen zum Wechseln in den Byte-Modus signalisiert der Host-Computer, daß er bereit ist, Daten vom Drucker zu empfangen. Dies geschieht, indem der Host-Computer den Datenbus in einen Hochimpedanzstatus versetzt und HostBusy (nAutoFd) auf Low setzt (Events 14 und 7).
2) Der Drucker legt die zu übertragenden Daten auf den Datenbus (Event 15).
3) Der Drucker setzt PtrClk (nAck) auf Low (Event 9).
4) Der Host-Computer setzt HostBusy (nAutoFd) auf High zur Anzeige, daß er Daten gesperrt und das Signal in Event 9 empfangen hat (Event 10).
5) Der Drucker muß die vier Statusleitungen wie unten gezeigt (Event 13) belegen.

•PtrBusy (Busy):	Zurückgekehrt in den Status, der im Forward-Modus galt.
•nDataAvail (nFault):	Auf Low gesetzt, wenn Daten zu senden sind.
•AckDataReq (PError):	Auf Low gesetzt, wenn Daten zu senden sind.
•Xflag (Select):	Xflag (Select): Auf den Status gesetzt, der bei der letzten Verhandlung ausgehandelt wurde (beispielsweise auf Low).

6) Der Drucker setzt PtrClk (nAck) auf High (Event 10) und beendet das Byte-Handshake (Event 11).
7) Der Host-Computer signalisiert, daß er die Daten erfolgreich empfangen hat. Dies geschieht, indem er HostClk (nStrobe) zunächst auf Low (Event 16) und dann auf High (Event 17) setzt.
8) Die Events 10 und 16 treten möglicherweise zugleich ein, ebenso die Events 7 und 17 (zum Beispiel, wenn HostBusy und HostClk zugleich verwendet werden). Wenn dies der Fall ist, stellt der Host-Computer den aktuellen Status fest, indem er prüft,
   1. ob weitere Daten vorliegen, die vom Drucker zum Host-Computer gesendet werden sollen, und
   3. ob Daten vom Host-Computer zum Drucker übertragen werden können.
9) Nach der Übertragung eines Datenbytes signalisiert der Drucker dem Host-Computer, ob weitere Daten zur Übertragung vorliegen. Wenn der Host-Computer feststellt, daß keine weiteren Daten vom Drucker kommen, wählt der Host-Computer einen der folgenden drei Stati:
   1. Durchführung der Terminierung und Rückkehr in den Kompatibilitätsmodus
   2. Verbleib in der Phase "Host Busy Data Not Available"
   3. Setzen von HostBusy (nAutoFd) auf Low und Wechsel in die Phase "Reverse Idle" (Event 7)
10) Wenn der Drucker weitere Daten senden will, wählt der Host-Computer einen der folgenden drei Stati:
   1. Setzen von HostBusy (nAutoFd) auf Low und Signalisierung, daß der Host-Computer bereit zum Empfang ist.
   2. Verbleib in der Phase "Host Busy Data Available"
   3. Durchführung der Terminierung und Rückkehr in den Kompatibilitätsmodus

2.5 Geräte-ID

Die Geräte-ID ist eine Zeichenkette, welche die Identifizierungsnummer, den Typ und weitere Informationen bezüglich des an die Schnittstelle angeschlossenen Druckers enthält. Wenn der Host-Computer von diesem Drucker die Geräte-ID anfordert, antwortet der Drucker mit der folgenden Geräte-ID:

<00>h<2A>h
MFG : CBM ;
CMD : CBM ;
MDL : iDP3220 ;
CLS : PRINTER ;

Die ersten zwei Bytes der Geräte-ID geben die Länge der gesamten Geräte-ID an (inklusive der ersten zwei Bytes selbst). Eine Beschreibung der Anforderung einer Geräte-ID finden Sie im Abschnitt "Verhandlung" weiter oben in diesem Anhang.

Wenn der Host-Computer die Zeichenkette mit der Geräte-ID in der durch die ersten zwei Bytes angegebenen Länge empfängt, muß dies unterbrechungsfrei erfolgen, bis die gesamte Geräte-ID empfangen ist. Wird der Vorgang während der Durchführung beendet, verwirft der Drucker den Rest der Zeichenkette; wenn der Drucker ein weiteres Mal die Anforderung der Geräte-ID empfängt, sendet er die Geräte-ID beginnend mit dem ersten Zeichen der ID.

Nachdem der Host-Computer die ID mit der durch die ersten zwei Bytes festgelegten Länge empfangen hat, muß er eine Terminierung durchführen, selbst wenn dem Drucker Daten vorliegen, die gesendet werden sollen (Data Available). Wenn der Host-Computer die Terminierung unterläßt und versucht, Daten zu empfangen, sendet der Drucker den Druckerstatus.

2.6 Terminierung

Terminierung ist ein Vorgang, um vom Nibble- oder Byte-Modus in den Kompatibilitätsmodus zurückzukehren. Bei Durchführung der Terminierung setzt der Host-Computer die Signale wie folgt:

- IEEE 1284 Active (nSelectln): Low
- HostBusy (nAutoFd): High (Event 22)

Es gibt zwei Arten der Terminierung:

(1) Terminierung durch Handshake zwischen Host-Computer und Drucker

(2) Sofortige Terminierung

(1) Termination through a handshake between the host and the printer:
Wenn aus dem Reverse-Modus in den Kompatibilitätsmodus geschaltet wird, kann diese Terminierungsart verwendet werden, sofern die Schnittstelle aktiviert ist (IEEE 1284 Active: High) und Event 22 stattgefunden hat.

1) Der Drucker antwortet auf IEEE 1284 Active, indem er PtrBusy (Busy) und nDataAvail (nFault) auf High setzt (Event 23).
2) Der Drucker kehrt dann Xflag (Select) um und setzt PtrClk (nAck) auf Low (Event 24).
3) Der Host-Computer setzt HostBusy (nAutoFd) auf Low (Event 25).
4) Der Drucker setzt nDataAvail (nFault), Xflag (Select) und AckDataReq (PError) auf den im Kompatibilitätsmodus festgelegten Status und setzt PtrClk (nAck) auf High (Events 26 und 27).
5) Der Host-Computer setzt HostBusy (nAutoFd) auf High, um das Handshake zu beenden, und versetzt die Schnittstelle in die Phase "Compatibility Modus Idle" (Event 28).
6) Der Drucker ändert PtrBusy (Busy), um Daten vom Host-Computer empfangen zu können.

(2) Sofortige Terminierung

1) Wenn die Schnittstelle deaktiviert wird (IEEE 1284 Active: Low), ohne daß zuvor Event 22 stattgefunden hat, führt der Drucker die Terminierung unverzüglich durch. Bei dieser Terminierung sind die Daten nicht gesichert, und der Drucker schaltet den Datenbus innerhalb 1 µsec von Ausgang auf Eingang.

In der Phase "Reverse Idle" kann der Drucker dem Host-Computer mitteilen, daß Daten zur Übertragung an den Host-Computer vorliegen. Diese Mitteilung kann gleichzeitig mit der Terminierung erfolgen, um den Host-Computer aus der Idle-Phase in den Kompatibilitätsmodus wechseln zu lassen.

Wenn dem Drucker Daten zum Senden vorliegen, initiiert er die Unterbrechungsphase durch die Events 8 und 9. In diesem Fall, falls 128 - Active (nSelectIn) auf Low geht, bevor HostBusy (nAutoFd) von High auf Low gewechselt hat, deutet der Drucker die Sachlage so, als ob der Host-Computer in die Terminierungsphase gewechselt und den normalen Terminierungs-Handshake abgeschlossen hätte.

ANHANG 3. ERMITTLUNG DES SENDESTATUS

Da der von diesem Drucker gesendete Status einige unveränderliche Bits enthält, ist es so möglich, zu ermitteln, zu welchem Befehl der Status gehört.
Wenn ASB (Automatic Status Back) verwendet wird, sollte allerdings das erste Byte des ASB geprüft werden, und dann sollten die drei nächsten aufeinanderfolgenden Bytes - mit Ausnahme von XOFF - als ASB-Daten behandelt werden.

Ermittlung des Sendestatus

Befehl und Funktion	Status
GS I	<0**0****>B
GS r	<0**0****>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0**1**10>B
ASB (1. Byte)	<0**1**00>B
ASB (2. - 4. Byte)	<0**0****>B

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05E-20000208-1000-0204-5500 Printed in Japan